

# JOURNAL

OF THE  
NEW ENGLAND  
WATER  
ENVIRONMENT  
ASSOCIATION

VOLUME 49 NUMBER 3 | ISSN 1077-3002 **FALL 2015**



## **ASSET MANAGEMENT**

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Maintenance—the forgotten key to wastewater treatment success

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Getting it right—opening lines of communication between engineering and operations when designing and building a wastewater treatment facility

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Achieving infiltration/inflow removal goals with a comprehensive approach

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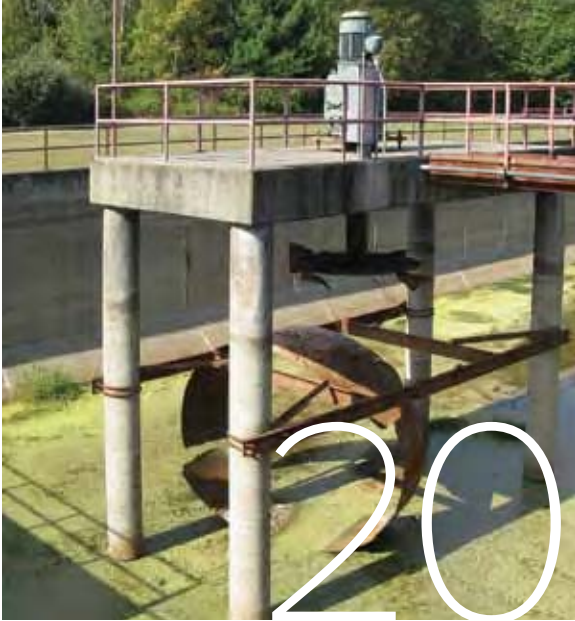
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VOLUME 49 NUMBER 3 | ISSN 1077-3002 FALL 2015

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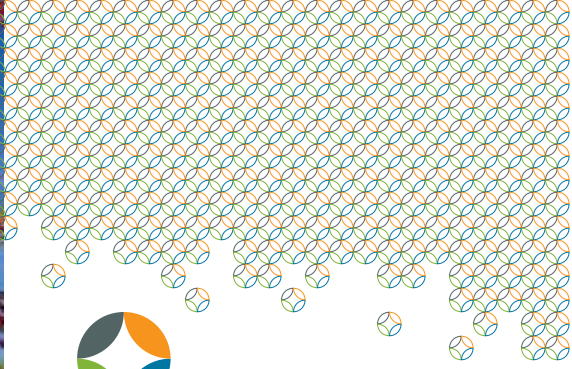
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## President's message

I hope that you and your families had a happy, healthy, and safe summer. As always in New England with the slower, longer, and more relaxed summer days behind us we tend to gear up for the new school year, colder weather, and of course all the great fall New England activities. NEWEA efforts, events, and outreach programs also mirror the moods of the seasons with fewer, more relaxed events in the summer while refocusing on the more numerous events of the fall. Below are highlights of the past few months as well as upcoming events.

The annual Committee Member Appreciation event was held on July 16 at Kimball Farm in Westford, Mass. Around 110 NEWEA members celebrated another year's volunteer efforts and enjoyed each other's company. This summer also included the NEWEA Teacher Training Workshop at the Waterworks Museum in Boston on August 11. This event was attended by more than 30 area high school and grade school teachers to learn more about our industry and the NEWEA classroom presentations available for their use, and to participate in a hands-on World Water Monitoring Challenge workshop. The attendees expressed their gratitude to NEWEA for the opportunity and were excited to share their new knowledge with their students in the upcoming school year.

I would like to highlight three NEWEA specialty conferences coming this fall to make sure they get on your calendar. The first is the Northeast Residuals & Biosolids Symposium. This 1-day symposium co-hosted by NEWEA and NEBRA will be on Oct. 19 in Danvers, Mass. This symposium is being held the day before and at the same location as the 2-day *BioCycle REFOR15* (Renewable Energy From Organics Recycling) conference organized by *BioCycle*, a magazine (and website) covering composting, organics recycling, anaerobic digestion, renewable energy, and other process and products related to municipal and non-municipal sourced organics. Many are expected to attend both the symposium and the conference to share ideas and educate each other. The second speciality conference this fall is the 2-day CSO/Wet Weather Issues conference and exhibit on Oct. 26-27 in Lowell, Mass. This conference will highlight integrated planning issues. The third and final specialty conference of the fall, on Nov. 18 in Sturbridge, Mass., will focus on nitrogen removal compliance



**At WEFTEC NEWEA will receive the Water Environment Federation's prestigious Outstanding Member Association Award**

strategies for small communities. See the NEWEA website for more information about these events.

WEFTEC 2015 is right around the corner. This year it will be in Chicago in late September. NEWEA will have three Operations Challenge teams—Rhode Island, New Hampshire and Maine—competing against the nation's best. Best of luck to all three teams. Also as a slight change this year, the traditional Monday NEWEA WEFTEC luncheon will be replaced by a Sunday evening NEWEA reception held at Soldier's Field. I hope to see you there to enjoy views of the field and of Lake Michigan, and to connect with other NEWEA members in attendance.

Finally, I am pleased to announce to our membership that at WEFTEC, NEWEA will receive the Water Environment Federation's (WEF) prestigious Outstanding Member Association award. There are 75 member associations in WEF including NEWEA. The selection of NEWEA for this award by the WEF board of trustees was based on the following criteria: position of financial strength, membership retention and new membership, scholarship programs, student achievement and support, technology transfer, and awards programs and participation. Said before but worth repeating, NEWEA has shown itself once again to be an industry leader and WEF's marquee member association. A sincere

thanks and gratitude to the current and past NEWEA officers, committee chairs, volunteers, and staff for the many years of professionalism, vision, initiatives, and high-quality programs that have been recognized formally by this prestigious award at the national/international level. A special thanks to Mike Wilson and NEWEA's awards committee for pulling together the information WEF required for making this selection. I look forward to seeing many of you in Chicago.

As you know, success is contagious. If you are a passive NEWEA member please see this award as yet another reason to volunteer for this great association. Your volunteer involvement serves not only as an opportunity to "give back" to the profession but also has the added payback benefit of helping to further your professional development. By becoming a more active member you will surround yourself and learn from those who have put NEWEA in the position it is in today while making invaluable industry and personal contacts. Please reach out to me or to our great staff at the NEWEA office to increase your involvement and professional development through NEWEA.



## From the Editor

The fall *Journal* has industry news and feature articles that cross the gamut of water resources. Remember, if you do not submit an article, it cannot appear in the *Journal*. The purpose of the *Journal* is to share knowledge, our experiences, and our innovations. There is nothing like the feeling of opening up an educational publication and reading an article you wrote about your project.

**Industry News.** Read the article in Industry News about the Presidential Innovation Award for Environmental Educators given out by the Environmental Protection Agency at a recent White House ceremony to 15 teachers nationwide. Ross McCurdy, Ponaganset High School science teacher in Scituate, R.I., said, "We are fortunate that today's students understand the importance of environmental awareness and are enthusiastic to learn what they can to protect our natural world." I believe this bodes well for our industry, as these enthusiastic students are potentially the future practitioners. It is our responsibility to continue our commitment to community outreach to keep their enthusiasm alive as they grow and decide their future careers.

### Maintenance—the forgotten key to wastewater treatment success.

Asset management was the new buzzword of the industry a while ago. Initially it grew out of the municipal requirements of GASB 34 (in 1999). Initially many companies vied for position by creating canned software to help organize asset information. Since then it has become evident computerized maintenance management system (CMMS) software is only part of the answer. No CMMS is turnkey; training is essential to use CMMS correctly to provide its best value. Furthermore, the real key is to conduct predictive maintenance while a system is running effectively, rather than rely on reactive maintenance. Lack of preventative or predictive maintenance can easily result in the need to upgrade a facility prior to its useful life being reached. This article presents information supporting the theory that 25 percent of all preventative maintenance can do damage if done unnecessarily. The key of any CMMS is to train operators to recognize trouble so that corrective maintenance can be performed prior to a failure, minimizing costs and potential permit violations.

**Getting it right by opening lines of communication.** The possibility of upgrading a wastewater treatment

plant or building is a daunting decision. Economics, availability of new space, and unknown conditions affect the decision. To jump these hurdles it takes collaboration and communication from all parties. See how a small Maine community came to terms with the pros and cons of either upgrading a facility or building a new one, with positive results. Ellsworth, Maine, has completed the construction of a new economical facility. Hear from the facility's superintendent, Michael Harris, whose engagement in the project made all the difference.

**Achieving infiltration and inflow removal goals with a comprehensive approach.** For those of us who have been forever in search of the illusive infiltration and inflow in collection systems, we all know that water will seek the path of least resistance. Conducting sanitary sewer system evaluation studies (SSES) over a number of years can give conflicting information. In the most recent year, trends from year to year become less predictable. Read how regression analysis can reduce the inherent variability of year-to-year rainfall for conducting infiltration and inflow

analysis. In addition, read about a manhole rehabilitation technique for use in the Northeast and other cold environments. This technique reduces the impacts of the frost thaw cycle. Recent options for rehabilitation of manhole corbels are given.

**Perspective: Climate change forces a fundamental change of strategy—defense.** It is always good to revisit our suppositions of past years and update based on new information. In 2009, the spring *Journal* carried an article on climate change adaptation. The author of this 2015 climate change article provides a further perspective.

In closing, I want to thank committee member Matthew Hross for volunteering as the guest editor. Mr. Hross is one of our younger members, and he has volunteered for many assignments over the last 2 years.

Helen Gordon, *Journal* Committee Chair and Editor



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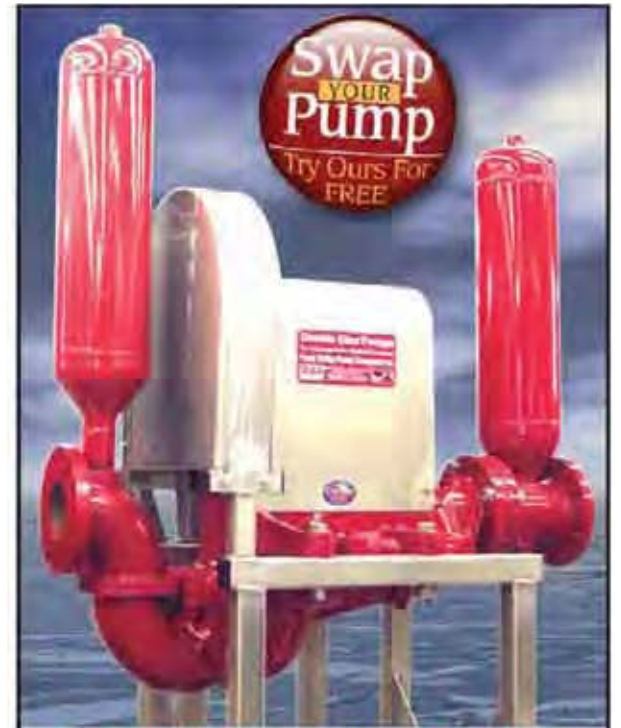
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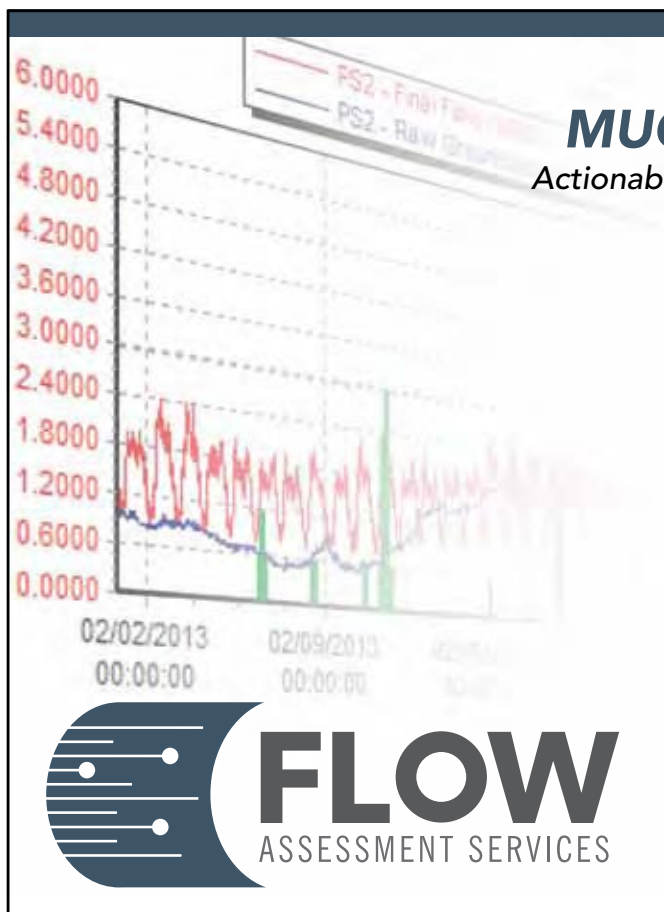
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# Industry news

Mystic River panorama

## NEW GRADING SYSTEM FOR MYSTIC RIVER WATERSHED GIVES PUBLIC BETTER LOCALIZED INFORMATION

*Environmental Protection Agency (EPA) Region 1 News Release*  
In coordination with the Mystic River Watershed Association (MyRWA), EPA is using an enhanced, more locally specific analysis of water quality in the Mystic River watershed to illuminate environmental conditions for the public. Instead of one grade for the entire watershed, EPA and MyRWA are issuing grades for each segment of the watershed, totaling 14 separate stretches of river and its tributaries.

The grades are based on bacterial contamination found in analyzed samples that were collected by MyRWA volunteers over the past year at 15 monitoring sites throughout the watershed, as well as data collected at numerous locations by the Massachusetts Water Resources Authority (MWRA). While an overall grade was created in 2006 to track water quality progress in the Mystic River watershed, the data now collected each year supports an improved and more sophisticated grading system. A grade can be assigned, using similar criteria as in the past, to each major segment or tributary in the Mystic River watershed.

The data have shown that water quality in the main stem of the Mystic River, including the Upper and Lower Mystic lakes, is good regularly. On the other hand, water quality in many of the urban tributary streams in the Mystic River watershed is poor. Water quality in the main stem of the river from the Mystic lakes, through Medford Square, and on to Boston Harbor, meets standards nearly all of the time, especially in dry weather. However, many of the tributary streams feeding the Mystic often do not meet water quality standards. Water quality is frequently poor due to bacterial contamination in tributary streams such as Winn's Brook, Little River, Mill Brook, the Malden River, the Island End River, and Mill Creek, even in dry weather. Investigations indicate the main causes of high bacteria counts in these water bodies are illicit sewer discharges to storm drain systems and uncontrolled urban stormwater runoff that contains pet and animal waste.

A second change to the grading system is that a 3-year rolling average will now be used to calculate the grade for each segment. A grade for each year is calculated the same as before; however, the current year's grade is averaged with the prior two years to produce the "rolling" 3-year average. Such a

Mystic River watershed water quality grades & compliance rates* calendar year 2014		
Grade	Water Segment	Compliance Rates
A+	Upper Mystic Lake	96%
A+	Upper Mystic Lake	96%
A	Mystic River (Salt Water)	90%
A-	Chelsea Creek	87%
B+	Mystic River (Fresh Water)	85%
C+	Aberjona River	65%
C	Belle Isle Inlet	64%
C-	Malden River	59%
D	Meetinghouse Brook	47%
D	Alewife Brook	46%
D-	Mill Brook	43%
D-	Little River	40%
F	Winn's Brook	33%
F	Island End River	33%
F	Mill Creek	32%

\*Average meeting Mass. boating & swimming water quality standards system allows for a more complete and accurate assessment of recent water quality and better addresses climate variability from year to year, while allowing for real data trends to be more easily discerned.

"Grading the watershed by segments provides the public with a more accurate assessment of local water quality conditions and greater transparency for all stakeholders," said Curt Spalding, regional administrator for EPA's Region 1. "It also helps EPA, MyRWA, and other agencies to focus our efforts on the segments with lower water quality. We also hope local communities will step up efforts to reduce illicit discharges."

"This new grading system provides a better understanding of water quality conditions in the Mystic River watershed," said EkOngKar Singh Khalsa, executive director of MyRWA.

"It illustrates that recreational boating in both the salt and fresh water sections of the Mystic River is safe nearly all the time and that swimming in the Mystic lakes is highly recommended. We hope this new data will inspire many more people to enjoy this valuable natural resource and encourage further investment in the protection and restoration of the local natural environment."

Throughout the past year there were continued efforts to improve water quality conditions in the Mystic River watershed. Both EPA and the Massachusetts Department of Environmental Protection (MassDEP) continue to pursue a number of active enforcement actions targeted at improving water quality throughout the watershed. Enforcement has resulted in the removal of more than 31,000 gallons per day of sewage from storm drains in the Mystic River watershed (nearly double the volume reported last year). Numerous additional illicit connections have been identified and are scheduled to be removed this year. Several additional repairs have prevented tens of thousands of gallons of sewage from discharging to the river during rain events. These aggressive efforts continue to address violations of water quality with regard to bacteria.

"This new methodology will be a very helpful tool," said Fred Laskey, MWRA executive director. "It will provide a roadmap to point out remaining water quality issues in the Mystic."

"From park improvements to new pedestrian paths to large-scale removal of invasive water chestnut plants choking the river, the Massachusetts Department of Conservation and Recreation (DCR) has joined in the campaign to improve the Mystic. We will continue our efforts with partners to make further improvements to the river and park surroundings," said Jonathan Yeo, director, Division of Water Supply Protection at DCR.

"We are very excited for this new report card style. Its detailed ratings will help our residents understand what parts of the watershed are safe and available for recreation, and at the same time provide the details we need on where to focus our efforts. We appreciate all the help we have received from our federal, state, and nonprofit partners to get us to this place, and we look forward to future efforts to bring the whole watershed up to the same beautiful conditions as the Mystic lakes," said Michael McGlynn, mayor of the city of Medford.

"As an urban community with the unique position of having a well-utilized waterfront, Somerville recognizes and

works to support ongoing efforts to keep our waterway clean and safe. We are reclaiming the Mystic as a recreational and environmental jewel. I commend EPA and MyRWA for their work in this area and look forward to our continued partnership," said Joseph Curatone, mayor of the city of Somerville.

Separate from the report card for bacteria, EPA recently launched a Mystic River water quality monitoring buoy in front of the Blessing of the Bay Boathouse in Somerville. This buoy measures a number of water quality parameters such as temperature, dissolved oxygen, pH, turbidity, specific



Aberjona River, Winchester, Mass.

conductance, and chlorophyll that can be viewed by the public in near real time. The data will be available on EPA's Mystic River website. In addition to providing real-time water quality data to the public, the buoy will be used to monitor and track cyanobacteria (blue-green algae) blooms.

EPA continues to foster a long-term effort to improve this watershed, including continued support of the Mystic River Watershed Initiative steering committee. The steering committee includes EPA and MyRWA representatives, as well as representatives from numerous public advocacy groups and municipalities throughout the Mystic River watershed. The steering committee serves as a coordinating and information-sharing body to help establish strategic direction and priorities, as well as to recommend and promote key projects and actions to improve environmental conditions in the Mystic River watershed.

For more information on EPA's Mystic River Watershed Initiative, go to: [epa.gov/mysticriver](http://epa.gov/mysticriver).

## SCITUATE, R.I. HIGH SCHOOL TEACHER RECOGNIZED BY PRESIDENT OBAMA & EPA

*EPA Region 1 News Release*

The federal government recognized a teacher at the Ponaganset High School in Scituate, R.I., for his work that has energized environmental education for students, the school system, and the community. Ross McCurdy received the Presidential Innovation Award for Environmental Educators given out by the EPA at a recent White House ceremony. The Presidential award was given to 15 teachers nationwide at the ceremony last month that also honored 60 students in nine states with President's Environmental Youth awards. Morgan Cuthbert, teacher at the Frank Harrison Middle School in Yarmouth, Maine, received honorable mention.

Mr. McCurdy has been helping students connect with the environment during his 17 years as an environmental educator, teaching science to students in grades 10 through 12. At Ponaganset High School he creates challenging, hands-on learning opportunities, encouraging students to apply what they learn in class to solve real-world problems. "Ross McCurdy makes lessons relevant and fun," said Mr. Spalding. "He encourages his students to be active participants in the challenge of improving the environment."

"We are just as reliant upon our environment now as we were 10,000 years ago, and recognizing our innate connection with the environment is essential to our quality of life," said Mr. McCurdy. "We are fortunate that today's students understand the importance of environmental awareness and are enthusiastic to learn what they can to protect our natural world. As teachers it is up to us to provide every opportunity for our students to take care of our environment both now and into the future."

The Presidential Innovation Award for Environmental Educators is administered by The White House Council on Environmental Quality in partnership with EPA to encourage educators who incorporate environmental education in their classrooms and teaching methods. Teacher awardees receive a plaque and an award of up to \$2,500 to further their professional development in environmental education. The teacher's local education agency also receives an award of up to \$2,500 to fund environmental educational activities and programs. Honorable mention recipients receive certificates.

Mr. McCurdy's students have done extensive research on renewable energy technologies and applied this knowledge to several projects, including creating a hydrogen fuel cell-powered Ford Model T, preparing and driving coast-to-coast in a turbo diesel pickup truck fueled by biodiesel, and even forming a musical group that powers its musical equipment using a 1,000-watt hydrogen fuel cell with alternating current output. His students also built a 16- by 8-foot solar building on the school's grounds. The building, named the Solar Shed, included contributions from students in wood tech and alternative energy classes.

Mr. McCurdy was also pivotal in developing the environmental science curriculum at his school. Through his efforts, Ponaganset now offers science and alternative energy and sustainable systems classes. Sustainable concepts are now integrated into the broader school curriculum.

Sustainable clean energy technology was installed, in part thanks to Mr. McCurdy, during renovation and expansion of the high school and construction of a new middle school. Both schools now have biomass heating systems that use waste wood chips from the local lumber industry.

In addition to the EPA award, Mr. McCurdy received a Bartlett merit award, established by the National Environmental Education Foundation in 2007 to distinguish teachers who best represent Richard C. Bartlett's passion for and leadership in environmental education. Mr. Bartlett, who died in 2011, believed the role of teachers in integrating environmental education is critical to preserving the natural world.

Bartlett award winners are chosen by a national panel of judges for demonstrating creative, replicable approaches to environmental education, adopting an interdisciplinary approach to integrating environmental education across subject areas, engaging other adults in their schools and communities into their environmental education efforts, and increasing student achievement within and beyond the classroom. Mr. McCurdy was given \$750 as a Bartlett merit award winner in recognition of how he supercharges his science classes with more than just fuel cell technology, giving lessons a boost of intrigue that drives students' interest in renewable energy.

A long-time environmental advocate, Mr. Bartlett was chairman of the board of trustees for the National Environmental Education Foundation from 2003 to 2007 before becoming an honorary board member. His expansive conservation work began in the 1980s at The Nature Conservancy, and he became chairman of The Nature Conservancy of Texas in July 1994. Mr. Bartlett also wrote *The Sportsman's Guide to Texas* (with his wife, Joanne Krieger) and *Saving the Best of Texas: A Partnership Approach to Conservation*.

More information is available from [www2.epa.gov/education/presidential-innovation-award-environmental-educators](http://www2.epa.gov/education/presidential-innovation-award-environmental-educators).

## WATER ENVIRONMENT FEDERATION LAUNCHES STORMWATER AND GREEN INFRASTRUCTURE AWARDS PROGRAM

*Water Environment Federation, "This Week in Washington"*

The Water Environment Federation (WEF) announced a new national municipal stormwater and green infrastructure awards program. Developed through a cooperative agreement with EPA, the program will recognize high-performing regulated municipal separate storm sewer systems (MS4s) and inspire them to exceed requirements through innovative and cost-effective approaches.

"Many of WEF's utility members, along with a cadre of stormwater professionals nationwide, are leading the way in effectively addressing stormwater and wet weather issues," said Eileen O'Neill, executive director of WEF. "To remain on top of this challenge, they need opportunities to exchange best practices and learn about cutting-edge approaches for treatment, management, and financing. With EPA's support, WEF is able to provide such an opportunity that not only recognizes the success of stormwater professionals but

encourages the new ideas, programs, and leadership that are needed for tackling the growing demands that stormwater is placing on our communities."

Following a steering committee review and selection process, award winners will be announced in September at the 2015 Stormwater Congress, WEF's stormwater conference co-located with WEFTEC 2015 in Chicago. All participants will receive a certificate in either the gold, silver or bronze levels, with three winners from each category selected for program management, innovation, and overall winner with the highest score.

For 2015, phase-two applicants (which include small MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by the local permitting authority) needed to submit the phase-one application by Aug. 19, 2015. Phase-one applicants (which include medium and large cities or certain counties with populations of 100,000) needed to submit the phase-one application by Aug. 26, 2015.

The steering committee includes members and volunteers from WEF's Stormwater and Watershed national committees, as well as representatives from each of the following organizations: the Association of Clean Water Administrators, American Rivers, the American Society of Civil Engineers, the American Society of Landscape Architects, EPA, the National Association of Clean Water Agencies, the National Association of Flood and Stormwater Management Agencies, and the Water Environment Research Foundation.

For more information about this inaugural recognition program, visit [wef.org/ms4awards](http://wef.org/ms4awards) or contact [MS4Awards@wef.org](mailto:MS4Awards@wef.org). To learn more about the Stormwater Congress and WEFTEC 2015, visit [wef.org](http://wef.org).

## WATER ENVIRONMENT FEDERATION ANNOUNCES NEW STORMWATER INSTITUTE

*Water Environment Federation*

WEF has established the Stormwater Institute, a new venture to address the growing issue of stormwater and urban runoff. The institute will be housed within WEF to leverage the organization's leadership, breadth of membership, and varied partnerships with federal, state, and local entities responsible for managing stormwater issues.

"WEF has been a leader on clean water solutions for many years and has already established itself as a leading authority on urban runoff issues," said George Hawkins, chief executive officer and general manager of the District of Columbia Water and Sewer Authority (DC Water). "The expertise and engagement of WEF's membership will allow the Stormwater Institute to chart a new course toward a healthier and more sustainable stormwater system not only in North America but worldwide."

Bill Gaffi, general manager of Clean Water Services, added that "innovation is key to sustainable watersheds and communities, and better access to innovation puts a sustainable future within the grasp of more communities and can help inform policy making. The Stormwater Institute can play a powerful role in this regard, a role that would be smiled upon by both Mother Nature and ratepayers."

The Stormwater Institute will be a center for excellence and a resource for stormwater practitioners and regulator communities. Stormwater is the only growing source of water pollution in many watersheds throughout North America. As urban areas grow and more severe weather occurs, the issue of stormwater management will only increase in importance.

"With increasing severe weather events and limited budgets, innovation in stormwater management and financing is becoming increasingly vital to communities across North America," said Ed McCormick, president of WEF. "The WEF Stormwater Institute has been created in direct response to a gap in the water resource recovery sector for a central stormwater leadership, information, and advocacy hub. With more than 36,000 members across the globe, we are thrilled to apply our unique strengths to tackle these vital issues and provide effective and efficient solutions to the thousands of water communities that we serve. WEF is very excited about connecting stormwater professionals from both our MAs (member associations) and regional stormwater organizations as we collaborate to provide leadership across North America."

The growing issue of stormwater pollution coupled with regulatory pressure has created a need for national leadership that the Stormwater Institute aims to provide. The institute will focus initially on development of technical tools, professional training, and networking opportunities for stormwater practitioners worldwide. Many existing stormwater initiatives within WEF will be brought under the umbrella of the institute, and new programs in key areas such as green infrastructure will be developed.

WEF's commitment to the institute will include dedicated full-time professional staff as well as significant funding for collaborative projects. Additional announcements about the structure and programs of the Stormwater Institute will be made in the weeks ahead.

For more information, visit [wefstormwaterinstitute.org](http://wefstormwaterinstitute.org).

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# Maintenance—the forgotten key to wastewater treatment success

ROBERT HYDOCK, CMRP, Fuss & O'Neill, Manchester, CT  
JEFFREY MCDONALD, P.E., Fuss & O'Neill, Manchester, CT

**ABSTRACT** | The town of Putnam, Conn. had not experienced an upgrade of the water pollution control facility (WPCF) since it went on line in the mid-1970s. Reactive maintenance practices and aged equipment led to frequent failures and loss of treatment facility integrity. Besides upgrades and replacement of aged equipment, the facility needed to incorporate a robust preventive maintenance program. Putnam's WPCF maintenance program provides an excellent example of how communities can save in repair and replacement costs while improving their wastewater treatment operations. Virtually any city or town with significant equipment and infrastructure assets can benefit from this lesson.

**KEYWORDS** | computerized maintenance management system (CMMS), predictive maintenance

## INTRODUCTION

Hundreds of communities across the United States face the challenge of an underperforming wastewater treatment plant. Plant operators must often work with equipment that is constantly breaking down or unable to operate at peak efficiency. The implications can be severe: untreated or inadequately treated wastewater flowing into local rivers or streams, posing health risks not just to area wildlife but to local residents as well.

Other cities and towns are not even that fortunate. Many find themselves having to renovate—or even replace—their wastewater treatment plants many years before they reach the end of their anticipated service life. These facilities often suffer from both equipment failure and structural deterioration.

These are typical problems faced by communities of all types and sizes, and in all areas of the country. And they typically share a common cause: lack of a preventive or predictive maintenance program to protect the facility and the equipment within.

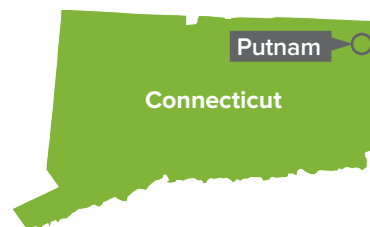
In fact, most wastewater treatment plants become operational without preventive maintenance plans. And when there are plans, they are typically limited to generic operation and maintenance manuals that are not user friendly and are usually quickly forgotten. In other cases, budgetary restraints force plant operators to handle

maintenance reactively, rather than heading off problems before they occur. In these facilities, maintenance is done poorly—when it is done at all—and it is common for plant operators to defer or ignore required maintenance.

It is extraordinary that cities and towns can invest tens of millions of dollars in wastewater treatment facilities and the equipment within without protecting that investment. Unfortunately, that is the rule rather than the exception. When a new plant

is completed and ready to start up, most municipalities cheerfully take the keys and never give maintenance a thought—at least until it is too late.

This is a common condition throughout American industry, but it can significantly affect treatment plants where many types of equipment, from pumps and belt presses to clarifier scraper systems and aeration units, are constantly exposed to organic materials that can either clog them or cause components to deteriorate. Treatment plants are exposed to a host of unique destructive organisms and materials, and they require a much more intensive predictive and preventive maintenance program than a typical building. Without preventive maintenance, wastewater treatment equipment will fail, and plants are much more likely to require replacement years before they should.



## A CASE IN POINT

Putnam is a community of approximately 9,000 residents in the northeastern corner of Connecticut, close to the Massachusetts and Rhode Island borders. The town's WPCF has not been upgraded since it went on line in the 1970s. Because of regular usage and a lack of preventive maintenance, much of the equipment within the facility was at the end of its service life by the early 2000s. Aged equipment and reactive maintenance practices left the facility in a state in which equipment failures were frequent and costly (both in expense and lost staff hours).

Even though the existing plant had redundant systems throughout, none of those systems performed adequately. Twenty years of reactive maintenance practices had led to a loss of critical back-up systems. These equipment failures ultimately forced the town to replace most of the equipment within the WPCF. Little of the process equipment could be salvaged. Modern blowers were installed to replace mechanical aeration; new pumps and grinders were added; a new belt press was included; and an ultraviolet purification system was incorporated for use in the summer to kill any bacteria that might make it through the primary system. This renovation cost more than \$18 million.

Town officials recognized that the equipment was being replaced much sooner than should have been necessary, and they were committed to making sure that this new equipment would retain optimal functionality for much longer. To that end, town officials implemented a robust maintenance program for all of the new equipment.

The cornerstone of the program was a computerized maintenance management system (CMMS), which allowed operators to monitor the performance of various pieces of equipment and document completed maintenance. Additionally, the CMMS estimated when pieces of equipment and parts could be expected to lose efficiency or fail. A robust documented preventive/predictive maintenance program was also developed to promote a longer lifecycle and lower the plant's operating costs. This included setting up appropriate preventive maintenance tasks and schedules to perform inspections, lubricate, change filters, change wearing components, and carry out other related work as efficiently as possible. Combined, the CMMS and preventive maintenance schedule permitted operators to monitor the performance of the equipment and predict impending breakdowns so parts could be replaced or adjusted before those breakdowns occurred. The maintenance program also included countermeasures to keep contamination out of oil sumps, reducing repair costs and increasing longevity.

Nevertheless, preventive maintenance sometimes is not enough, and repairs need to be made. An autonomous maintenance routine was formalized



Aeration equipment failure



Clarifier equipment failure

and standardized for all operators, and operators were taught how to recognize signs of trouble so corrective maintenance could be done sooner, thus reducing waste and minimizing collateral damage.

The Putnam wastewater CMMS was set up to meet the unique requirements of the town's WPCF. The system is scalable so new equipment can be added and so the maintenance program can be adjusted to manage that new equipment. Also, other town assets, such as public works equipment, can be added to the CMMS, thus increasing its utility beyond the WPCF.

## WHAT CITIES AND TOWNS CAN LEARN FROM PUTNAM'S EXPERIENCE

Putnam's WPCF maintenance program provides an excellent example of how communities can save in repair and replacement costs (not to mention in staffing expense when repairs require overtime),

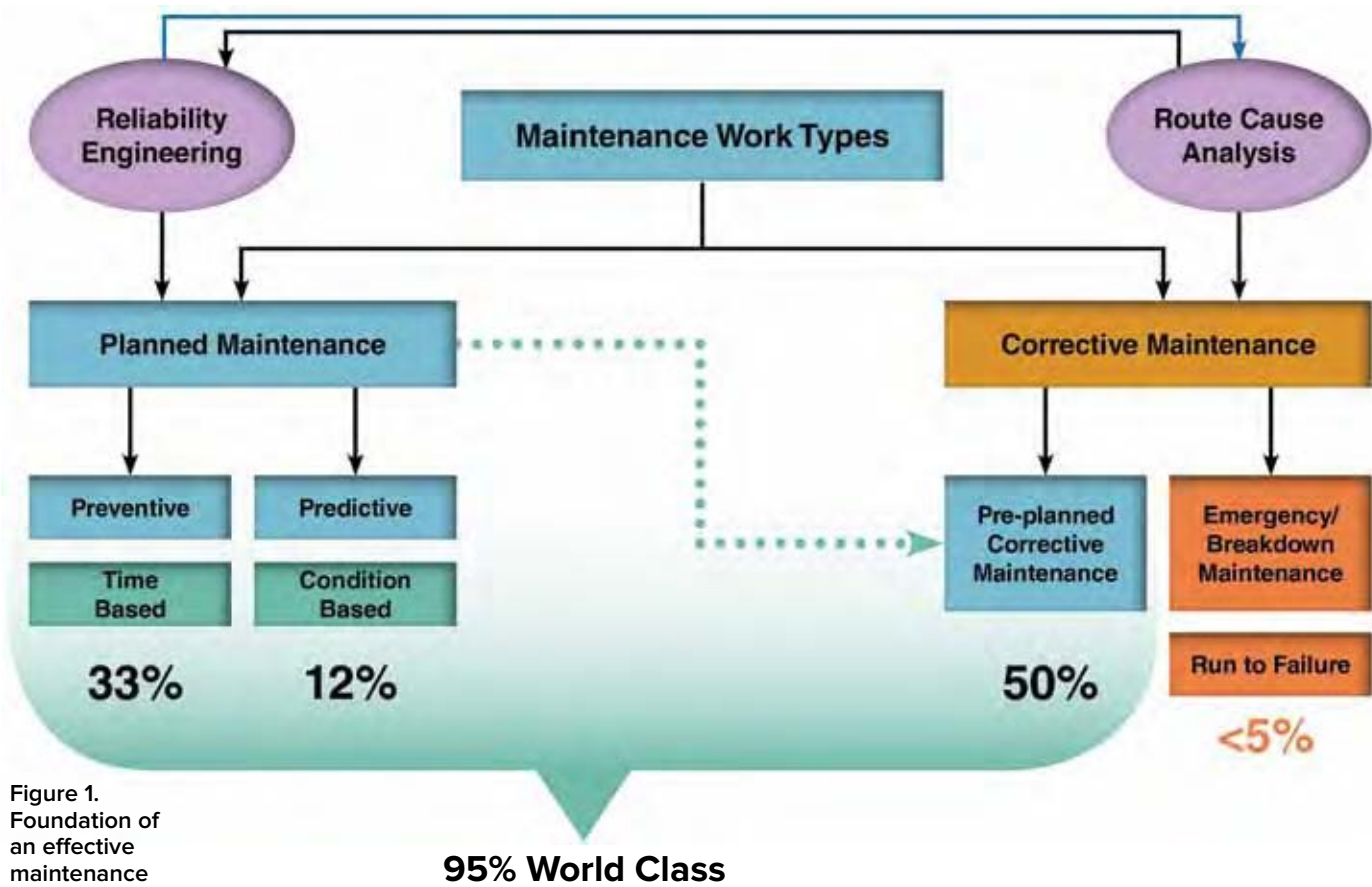


Figure 1. Foundation of an effective maintenance process

95% World Class

while improving wastewater treatment operations. The lesson can benefit virtually any city or town with significant equipment and infrastructure assets.

The essential element of any program is a CMMS. Such a system, which stores data safely and securely on cloud-based networks, serves as mission control for all maintenance work repair and cost history. It allows wastewater officials and plant operators to constantly monitor the effectiveness of equipment and predict when problems are likely. This information allows operators and maintenance staff to head off problems by conducting repairs or replacing potentially problematic parts.

A CMMS is, however, only as good as the method operators use to classify their assets. The program needs to include a database of all equipment, and required maintenance and replacement schedules for each piece of equipment in that database. The program also must recognize how the condition of each piece of equipment is likely to evolve over time and respond to that anticipated evolution. So, for instance, the CMMS may call for a particular belt to be tightened every 6 months for starters, but if the equipment wears, the frequency may increase. The CMMS will allow this information to be tracked and indicate when something has changed. The costs to maintain, overhaul, or replace can then be evaluated and allow informed decisions.

Predictive maintenance offers obvious benefits, but it is more than anticipating problems to prevent them, rather than fixing them after they occur. Predictive maintenance is typically performed while equipment is running, unlike preventive—or worse yet—reactive maintenance. As a result, plants that utilize predictive maintenance are much more efficient and don't suffer from unexpected shutdowns that can undermine treatment operations.

Important to note, it is not always wise to “go by the book.” Hundreds of pieces of equipment with thousands of moving parts, from huge conveyors to tiny ball bearings, are in a treatment plant. Rather than rely solely on manuals for individual parts to determine when and how to conduct maintenance, planners must also trust their experience as to how they will use that equipment. Sometimes, unnecessary maintenance can be just as damaging as inadequate maintenance. For instance, opening a piece of equipment to visually inspect it can allow contaminants to be introduced into that equipment. In fact, it is estimated that if done unnecessarily, 25 percent of all preventive maintenance can actually do damage. That is why when creating and implementing a maintenance program operators and maintenance managers must intimately know their equipment, how it is being used, and how it should perform. The use of predictive tools will allow the

condition of the equipment to be checked without doing damage or even shutting it down. Predictive tools allow maintenance to be done only when the equipment tells operators and maintenance staff it needs to be done.

The CMMS with a comprehensive PM (preventive maintenance) and predictive program can help avoid damage from unnecessary maintenance and the waste of limited resources as well. It can identify where system failures are coming from so maintenance managers can determine which parts of the system require aggressive preventive maintenance and which do not.

Finally, training is essential to any preventive maintenance program. No CMMS is turnkey, instantly ready for use upon installation. Plant operators and maintenance staff need extensive training, both to operate the CMMS and to provide maintenance on each of the many parts and pieces of equipment within the plant.

Equipment maintenance is easier said than done. American industry suffers from a shortage of qualified maintenance professionals, and that deficiency affects municipal organizations too. Unfortunately, the dearth of maintenance professionals will likely get worse before it gets better. Today, almost 90 percent of all maintenance workers lack any formal training. Historically, workers would participate in an apprenticeship with a veteran worker to help learn the trade. However, apprenticeships have become scarce over the past 40 years, and now many of the experienced veterans who could provide training are preparing to retire.

At the same time, modern equipment is much more complex than it was just a few years ago, requiring greater expertise to maintain and repair. Today, it is more important than ever for maintenance professionals to receive formal training, either in a classroom or from a qualified consultant, to ensure that they know how to properly maintain and repair the equipment entrusted to them.

Likewise, training is essential to ensure that a wastewater CMMS is used correctly. An effective CMMS will always be created to meet the unique needs of a community and its various systems, so municipal maintenance staff must be trained to operate that automated system. Typically, a comprehensive CMMS training program can take a few days to weeks, depending on the complexity of the plant and systems. When the training is complete, maintenance staffs are qualified to manage the predictive maintenance program.



Putnam WPCF upgrade

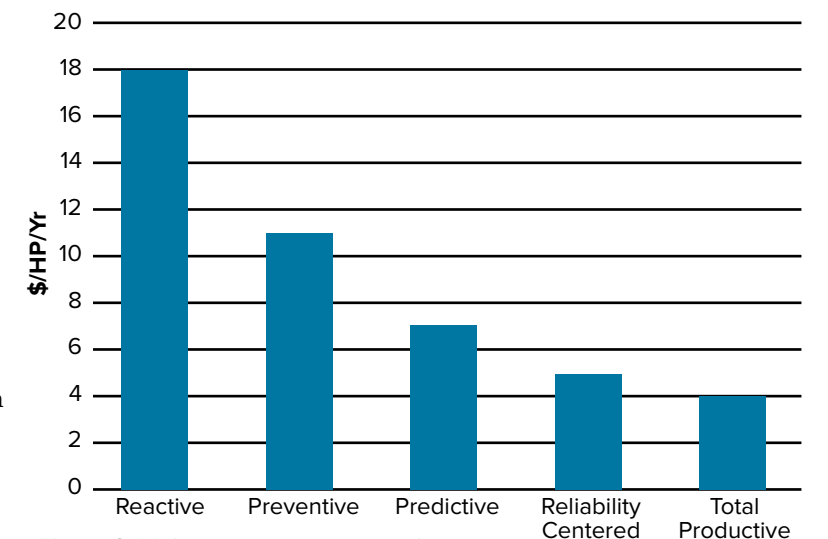


Figure 2. Maintenance cost comparison

**AN OUNCE OF PREVENTION**

The old cliché, “an ounce of prevention is worth a pound of cure,” is particularly true for wastewater treatment systems, which can have millions of moving parts. The cost of equipment breakdown or failure is exorbitant—both in equipment repairs or replacement and the potential health hazards. Every municipal wastewater system can benefit from the example of Putnam by implementing or improving a preventive maintenance program for its equipment and facilities.

**ABOUT THE AUTHORS**

• Robert Hydock, CMRP, and Jeffrey McDonald, P.E., are facilities project managers for Fuss & O’Neill.



# Getting it right—opening lines of communication between engineering and operations when designing and building a wastewater treatment facility

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ROBERT POLYS, P.E., Woodard & Curran, Portland, Maine

**ABSTRACT** | Designing and building a treatment facility is complex. To succeed, engineers and operators must break down barriers and collaborate during design, construction, and the initial years of facility operations. An operator typically understands the space, mechanical requirements, and actions required for day-to-day work, and can help the engineering design team account for practical considerations. Many older treatment facilities feel stuck at their current location. They also are often limited in their ability to implement upgrades based on the footprint of the existing facilities. However, based on dialog with the city of Ellsworth, Maine, planners, operators, and engineers were able to think outside the box and develop a plan to design and build a new facility at a new off-site location that was both economical and state-of-the-art. Building a new wastewater treatment facility (WWTF) at a new location has allowed the city to address the lack of adequate sanitary wastewater infrastructure that challenged goals for expansion of the local economy. This and the cost-saving features of the new WWTF demonstrate the value of the city's decision to invest in a new facility and provide sustainable utility service.

**KEYWORDS** | wastewater treatment facility (WWTF), operations staff, biological treatment, odor control, effluent discharge, green building techniques



Ellsworth, Maine WWTF under construction

## INTRODUCTION

A WWTF typically operates for 20 to 30 years before major upgrades are required. When it comes time to build new or upgrade, it is important to get it right the first time. Designing and building a new facility or upgrading an existing one is complex—particularly when starting from a blank slate. Everyone involved in the project has a wish list, but it is important to balance expectations with project milestones and budget considerations. Still, an engineer never wants to hear from the operations staff, “I didn’t know it was going to be like that.” To avoid this, historical barriers that may be in place between engineers and plant operations staff must be broken down to allow both parties to effectively collaborate during the design and construction phases, and provide startup assistance during the beginning years of operations following initial startup.

## THE CITY OF ELLSWORTH'S DILEMMA

As cities and towns grow, both residentially and commercially, they often struggle to meet increased demands for utility services. This is frequently the case with wastewater treatment. Many municipal treatment facilities were built when direct state and federal grant program assistance was abundant in the 1970s, and much of that infrastructure is nearing or beyond the practical end of its life. Municipal planners face the choice to implement upgrades to existing facilities or to build new infrastructure. Doing nothing is often not an option. Moreover, federal and state regulations are only becoming more stringent, which adds pressure on cities, towns, and the operations staff to improve their treatment systems.

The city of Ellsworth faced this dilemma. The city is the service center for the Downeast region of Maine. Three million visitors travel through the city on their way to two of the state's most popular tourist destinations: Bar Harbor and Acadia National Park. It is also one of Maine's fastest growing cities. From 2000 to 2010, Ellsworth grew by 20 percent. Its original WWTF, located in the middle of the downtown waterfront area and built in 1978, was undersized and had little room for expansion. Vehicle traffic entering and exiting the site was dangerous because of a blind corner and a hill at the entrance. The facility's outdated technology and equipment required frequent repair and replacement. The facility was expensive to maintain and lacked sufficient treatment process redundancy, which presented significant challenges when treatment units and unit processes were off line. All the treatment processes were set up in the same space under one roof, which would not meet current code requirements.

During wet-weather events, inflow and infiltration into the collection system caused overflows to the Union River and resulted in negative environmental impacts. These issues prompted the Maine Department of Environmental Protection (ME DEP) to require the city to sign a consent agreement to replace the outdated treatment facility.

## ASSESSING OPTIONS

The city assessed its options, which included upgrades at the existing site or a new greenfield facility at an off-site location. Upgrading the facility at the existing site was estimated to cost \$1.8 million less than building a new facility at an off-site location.

With a lower cost, why not upgrade at the existing site? First, it was not an ideal location. The facility was in the middle of the downtown waterfront area on a small footprint. Odors from the facility were a persistent issue, due to the nature of the building construction and the attached growth treatment process used at the facility. The facility also shared the site with a waterfront park and marina, and moving the WWTF would open up



Aeration and sludge storage tanks

the site to eventual improvements in those other facilities. In addition, a new location would provide sufficient space for each unit process while also accommodating future expansion. Keeping the old facility online during construction would provide for easier construction, startup, and eventual decommissioning.

There were some negatives, besides cost, associated with building at the new site. A new location would need to meet buffer requirements with neighboring properties. Furthermore, a new site would necessitate a new main pump station and new treated effluent conveyance infrastructure (i.e. piping and outfall).

Ultimately, Ellsworth decided to build a new treatment facility at a new 5-acre site that provided adequate buffer from nearby landowners. This would improve the quality of life downtown and solve odor and noise issues. The location provided the space to create a campus-type setting for the WWTF, with it tucked into a wooded location. The extra space would also allow for building additional process changes with minimal disturbance, if future regulatory changes required alterations. The new site also offered safer and improved road access for septage, hauled waste, deliveries, and staff access.

## REGULAR MEETINGS DURING THE DESIGN PHASE

The engineering team set up monthly meetings with Michael Harris (superintendent of the Ellsworth Wastewater Department) to go through drawings and to review each unit process. Later, as the design progressed, the project design team met as frequently as weekly or bi-weekly with Mr. Harris to discuss unit processes, access to features in the facility, and more. These meetings enabled operations staff to be heavily involved in the design of the new facilities.



Process and chemical handling, and operations buildings

During the design phase, conveying the intent and meaning of drawings to allow a full understanding of an actual physical space to be built can be challenging. Operations staff understand the space required, and staff input is invaluable in helping the design engineering team account for practical considerations. Regular meetings and coordination between the engineering design team and the operations staff helped to accurately convey the design intent shown on paper.

For example, the initial preliminary design for the operations building at the new WWTF had the superintendent's office next to the chief operator's office. However, Mr. Harris pointed out that it made more sense to expand the chief operator's office and move it next to the lab, where he spends most of his time. Making changes to the size and location of a room required corresponding changes in structural and architectural design, as well as lighting, HVAC, and electrical services, but since these changes were done at the initial stages, it was easy to make modifications.

Along with the layout and flow of the buildings, there were further discussions regarding the orientation of equipment and specific materials of construction in each area and process mechanical system, such as types of piping, valves, gauges, pumps, etc. Often, during a design process, time is wasted with re-work. Working with Mr. Harris and the operations team allowed discussions to advance, and consensus was established as a basis for design. This allowed the engineering design team to focus on moving forward, and the operations team understood how the new facility would be when completed. When the design contract documents were finalized and construction began, the staff had no surprises.

#### FEATURES OF THE NEW FACILITIES

A new main pump station—the sole means of transporting wastewater to the new facility—was built at the old WWTF site to take advantage of the collection system infrastructure. The building was designed to blend well with the surrounding

architecture. The station is a dry-pit/wet-pit type with a peak capacity of 6 million gallons per day (mgd) (23 M L/day) and a system of two normal-duty and two high-flow pumps ranging from 100 to 150 horsepower which allows the city to better manage peak flows during wet-weather events.

Flow is transported from the old plant site to the new facility's headworks via two force mains. Preliminary treatment includes a 0.12-inch (3-millimeter), perforated-plate, center flow band fine-screening system with washing, dewatering, and compaction systems. Following screening, grit is removed in the headworks via an aerated grit tank. The settled grit is transported to a lower sump area of the tank via a cross-collector screw auger. The aerated grit tank contains a submersible grit pump with a fluidized sump for transport of grit slurry to a cyclone/classifier for cleaning, washing, and discharge into a container for off-site disposal.

A plug flow, activated sludge, biological treatment process with anoxic selectors was implemented at the new WWTF. The biological treatment system is sized for an average flow of 1.65 mgd (6.2 M L/day); however, the facility can handle up to 6.1 mgd (23 M L/day) of peak-hour flow in wet-weather events. Management of high-flow operations requires minimal staff intervention. The biological treatment system includes a tapered, fine-bubble, diffused-aeration system, staged anoxic selectors, and an aerobic/anoxic swing zone with submersible internal mixed liquor recycle pumping for additional process control flexibility and nitrogen management. This system will provide the flexibility needed to ensure high-quality effluent. With minor modifications, this treatment process also enables the city to accommodate future changes in the regulatory requirements.

Solids/liquid separation occurs via two 65-foot (19.8 m)-diameter circular-spiral, rake-type secondary clarifiers with rotating sludge collection drums. The clarification systems include density current baffles to assist with solids settling. An aluminum geodesic dome covers each clarifier.

A five-pump, normal-duty and high-flow return activated sludge (RAS) and waste activated sludge (WAS) system for sludge return and waste sludge pumping is also included at the facility. The pumping systems operate via electrically operated control valves to accommodate solids inventory management as well as the wide fluctuations in influent flow which can occur. The facility includes two dedicated aerobic sludge-holding tanks with floating mixers and diffused, coarse-bubble aeration systems. Thickening occurs via settling and decanting with an adjustable, variable speed, rail-mounted submersible decant pumping system. A liquid emulsion polymer feed system assists with settling as needed. A rotary lobe pump pulls WAS from the sludge storage tanks to feed a centrifuge as part of sludge dewatering.

Polymer feed for dewatering occurs via a liquid emulsion mixing and delivery system. An incline and leveling shaftless screw conveyor system transports dewatered sludge cake to a roll-off container for off-site disposal.

A new chlorine contact tank provides disinfection. At the beginning of the tank, clarified effluent is disinfected via a chemical chlorine solution (sodium hypochlorite), which is delivered by a high-efficiency, submersible induction mixer. At the end of the tank, a chemical solution of sodium bisulfite is introduced to remove any residual chlorine in the wastewater prior to discharge to the Union River.

Odor control—a persistent problem at the old facility—is mitigated in the sludge dewatering area through a dedicated chemical scrubber system, which was salvaged from the old facility prior to demolition and refurbished. Odor in the headworks and septage handling facilities is controlled via a dedicated activated carbon system.

A new effluent discharge outfall to the Union River was an important piece to the project. Following data collection and modeling of the tidal river's estuary, an outfall location for the new plant was selected further down river in the estuary. A multi-port diffuser system enhances mixing for dilution of the treated effluent discharge. In a unique design approach, the outfall is also oriented parallel to the shoreline in order to avoid encroachment into a federal navigation channel.

The new WWTF includes several green building techniques that provide long-term savings for the city and the Wastewater Department. The Bayside Road WWTF and main pump station have state-of-the-art and energy-efficient building HVAC systems. Several buildings include energy recovery ventilation (ERV) systems, which exchange the energy (hot or cold air depending on the season) contained in the normally exhausted building air and use it to precondition the incoming outside air. During the warmer months, the system pre-cools and dehumidifies while humidifying and pre-heating in the cooler months. The ERV system reduces energy costs, meets ASHRAE ventilation and energy standards, and improves indoor air quality. The Bayside Road WWTF also uses an effluent thermal heat pump system, which uses treated wastewater (chlorinated effluent) as a source/sink of energy for heating and cooling of facility buildings. A supplemental, high-efficiency propane boiler system was also included to assist with peak heating demands. Because of the efficiency of the effluent system, however, the facility has minimal heating costs associated with fuel purchases. The operations building, which contains the facility's offices and meeting spaces, maximizes energy efficiency with soy-based, spray-foam insulation, insulated concrete wall formwork (ICF), and an in-floor radiant heating system.

## Michael Harris

has been the superintendent at the Ellsworth, Maine WWTF since January 2005. He started his career in 1989 as an operator assistant in Virginia Beach, Va. Over the years,

he has encouraged many young people to join the wastewater profession, and he tells them not to be overwhelmed by the stigma sometimes placed on wastewater workers by those outside the profession. "Just tell them that it's a long, stable, rewarding career," says Mr. Harris. "And there are a lot of things you can do. If you like computers, you can work with SCADA, and in some places, like Virginia where I worked previously, they had an automotive and machine shop."

The city of Ellsworth recently undertook an ambitious but necessary project to construct a new WWTF at a new location. "Because of budget or code constraints, you realize that you're not going to get your dream facility," Mr. Harris comments "But you do need to advocate for the things that you want that are critical." For example, Mr. Harris knew that he needed covers on his clarifiers. "I said, look, we're going to have subzero temperatures, and because our plant was built for future growth, initially the water would be moving slowly. I didn't want to end up with icing on the clarifiers." Harris also wanted a center-flow band screen to get good removal before the wastewater enters the plant.

One of the biggest challenges with the new facility is the new automation, for example online dissolved oxygen and hydrogen sulfide meters. "It's great to have them, but if a sensor goes bad it has to be fixed and calibrated. The cost of that is something new to incorporate into your budget."

If you are thinking about building a new plant or upgrading an existing one, Mr. Harris recommends a reserve account for future requirements. "Really, you should put money aside every year to help keep your plant up and running properly, or for upgrades, because it's so tough to get money from government grant programs," he says. "If you have large breakdowns or need to meet a new permit and you're stuck, having a reserve fund will help you get out of a jam."

Mr. Harris remains engaged with industry organizations through the Operations Challenge, which are competitive events for professionals in the wastewater treatment industry. At the event, teams of four members compete in five separate events (collection systems, laboratory, process control, maintenance, and safety) regionally to earn the right to represent nationally. Mr. Harris compares it to lumberjack competitions. He competed in the events for 13 years, and his team won three national titles. Currently, he serves as an event coordinator.







Chlorine contact tank, pump building and maintenance shop, and secondary clarifiers

Additional savings result from a new advanced supervisory control and data acquisition (SCADA) control system with radio communications to the city's nine remote collection system pump stations and the new main pumping station. High-efficiency, centrifugal turbo blowers that deliver low-pressure process air to the biological reactor (aeration tanks) provide cost savings as well for a typically energy-intensive area. The new electrical systems include energy-efficient lighting, intelligent motor control centers, premium efficient motors, and variable frequency drives.

#### PLANNING FOR AND IMPLEMENTING STARTUP

The new facility, with its advanced controls and electrical systems, requires less manual operator intervention compared to the old facility. The same operational staff transferred to the new facility and, with the new technology and accommodation for wet-weather events, operations are much improved. As with any new facility or upgrade, though, staff had to negotiate a learning curve during the initial year of operations at the new facility.

This learning curve was streamlined through communication and coordination with staff during design. The coordination between the design team and the operations staff also included discussion and definition of how to control each process system. The up-front design coordination eased the transition and learning curve for process control of each system. Discussions during the design phase were naturally not as detailed as final training, but, based on discussions and early feedback, the design team and operations staff were on the same page. A general feel for each process system and how to control it were keys to a smooth startup and initial year of facility operations.

Once the facility and control system went on line, Mr. Harris had full control of the facility operations

along with process control changes. The system was also set up with different levels of security, so staff could get used to maneuvering with screens and acknowledging alarms. This allowed staff to gain an understanding prior to making set point and control adjustments. The security structure allowed the superintendent to have ultimate say on changes to set points and facility operations.

Several mechanical differences are included in the new facility. Operations staff were closely involved in the process selection of equipment used as the design basis for each unit process. In particular, based on discussions with operations staff, an investment was made in fine-screening equipment. The plug flow, activated sludge process on its own does not require the use of fine screening, but after discussions with the facility staff and economic considerations for long-term plant operations, fine screening was implemented at the new facility. A 0.12-inch (3-mm), perforated-plate fine screen was selected to keep material out of the treatment process and the sludge cake as well as to minimize wear on equipment downstream.

As another example, operations staff helped to select the sludge dewatering system for the new facility. The old facility used a belt filter press for sludge dewatering. A centrifuge was selected as the sludge dewatering technology. The centrifuge allows the new facility to obtain higher dry solids content in the dewatered sludge cake consistently, reducing annual disposal costs.

The old facility used an attached-growth process, whereas the new facility uses a suspended-growth process. This new process requires education for process control and troubleshooting, especially with low flow during the initial years of facility operations. Staff easily understood how to operate the facility at the future design flows, but what about the 300,000 gallons per day (1.136 M L/day) of average flow at startup and during the initial years of operation? A startup and training class was held with the process design team and plant staff. As part of the class, the operations team went through simulated startup conditions prior to the facility being on line.

Because the old facility used an attached-growth process, the new facility was provided a "seed" of activated sludge from a suspended-growth facility. The city of Bangor, Maine, about a half-hour drive away, offered to help. Over two days, a 5,000-gallon (18,927 L) tank truck hauled four loads of Bangor's activated sludge to the new WWTF. On the third day, Ellsworth's new pump station began sending wastewater to the new facility, and operations staff continued to add activated sludge from Bangor until achieving the desired seed concentration. The staff drained the test water out of the clarifiers and the chlorine contact tank downstream so that if something was not working they could store wastewater

before any effluent left the facility. Once the two clarifiers began to fill up, staff took test samples. From day one, the Ellsworth staff met full permit compliance for effluent discharge.

#### BENEFITS FOR THE CITY

The city secured \$20 million of funding through Community Development Block grants, Rural Development grants and loans, state grants and loans, and federal earmarks to fund the project. The final project cost was less than the budgeted cost of \$20.5 million for the new facility, new pump station, new outfall, access road to the new facility, and demolition of the existing facility. A hauled waste offloading, holding, and metering system and a new laboratory will add revenue for the Wastewater Department and benefit the public seeking water and wastewater testing.

Energy efficiency, high-effluent quality, ease of operation, and flexibility in process control to accommodate current and future needs were key considerations in the design of the new facilities. The new facility's biological treatment process meets current permit requirements and can be streamlined if new permit requirements arise. The staged anoxic selectors at the front end of the biological treatment process are not necessary for current permit constituents, but they are important in providing effective process control to assist with facility operations. The selectors help maintain a population of biological organisms, which settle well, and provide alkalinity recovery and control overall effluent quality. Adding zones in the concrete tank helps the staff now and has provisions for the future.

Improvements at the new WWTF will enhance the water quality of the Union River, allowing the tidal area to be re-evaluated for shell fishing. Moving the facility to its new site also helped provide a buffer to odors for downtown residents and businesses.

The former WWTF occupied about 1½ acres of land at the edge of the Union River within a short walk to the city's downtown. With the removal of the treatment plant, the city can enhance and expand the adjacent Harbor Park and marina. Already, with the unpleasant sights and smells gone, the park has experienced a resurgence of activity, including hosting weddings. The Maine chapter of the American Council of Engineering Companies recognized the project by awarding it the 2014 Grand Conceptor award.

#### CONCLUSION—DIALOG IS KEY

Close interactions and open communication between operators and engineers throughout design and startup eased the transition to a new and improved WWTF. Every detail was discussed, from the manufacturers of pumps used in the return sludge system to the placement of valves. Staff



Operations building (offices and lab)

walked into a new facility with which they were familiar due to the fluid dialog.

Many older treatment facilities feel stuck at their locations and limited in implementing upgrades based on the footprint of the existing facilities. Because of the ongoing dialog with the city of Ellsworth, however, planners, operators, and engineers thought outside the box and developed a plan to design and build an economical, state-of-the-art facility.

Moving the WWTF to a new location has allowed the city to address the lack of adequate infrastructure that challenged goals for expansion of the local economy. This and the cost-saving features at the WWTF demonstrate the value of Ellsworth's decision to invest in a new facility and provide sustainable utility service for the city. 🌍

#### ABOUT THE AUTHORS

- Michael Harris has been the superintendent at the Ellsworth, Maine WWTF since January 2005. Read more about Mike on page 27.
- Robert Polys, P.E., project engineer with Woodard & Curran in the Portland, Maine office has seven years of experience specializing in wastewater treatment process and collection system design for clients in the municipal and private arenas. WWTF project experience includes design of biological treatment and nutrient removal systems including conventional activated sludge, sequencing batch reactor, and modified Ludzack-Ettinger (MLE) treatment systems.

# Achieving infiltration/inflow removal goals with a comprehensive approach

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**ABSTRACT** | Over the past 20 years, the town of Saugus, Mass., has experienced several large rain events that caused significant sanitary sewer overflows (SSOs). Extraneous water entering the sanitary collection system has exceeded the design capacity of the sewer system, forcing the town to pump excess wastewater directly into the Saugus River to protect its main pumping station and its residents. An administrative consent order (ACO) was issued to the town by the Massachusetts Department of Environmental Protection (MassDEP) that required an immediate evaluation of the sewer system to assess alternatives and recommend a program to control the SSOs.

A facilities plan evaluated several options to control SSO events. Ultimately, the study recommended comprehensive rehabilitation of nine critical subsystems over a 10-year period at a cost of \$32 million to achieve a 10-year level of control. The plan included complete comprehensive rehabilitation of the public sewer system in these subsystems, including lining all mainline sewers, service lateral connections from the main to the first joint, and all manholes, as well as a town-wide private inflow removal to achieve a 40- to 50-percent reduction of excess inflow and infiltration (I/I) in these areas during a 10-year storm event.

A pilot program enabled the project team to evaluate the effectiveness of the public and private comprehensive plan and to determine if removal goals could be met before proceeding with the entire program. Service connections on private property were intentionally not addressed in the pilot program subsystem to reduce costs and to properly evaluate the contribution of I/I from private service laterals.

This paper discusses the effectiveness of the comprehensive rehabilitation program to date, rehabilitation techniques, costs, private inflow removal, product warranty inspections, and results from pre- and post-construction metering linear regression analysis to determine percentages of I/I removed.

**KEYWORDS** | trenchless technology, comprehensive sewer system rehabilitation, I/I removal, consent order compliance, CIPP lining, manhole rehabilitation, service lateral connection lining

## INTRODUCTION

Saugus is approximately 9 miles north of Boston on Massachusetts' North Shore. Its population is roughly 25,000, and the town has a land area of approximately 12 square miles (31.08 square kilometers). The town owns and operates a town-wide wastewater collection system consisting of roughly 95 miles (152.86 kilometers) of sewer pipe (divided into 27 separate subsystems), and 11 wastewater pumping stations, as shown in Figure 1. All wastewater flows

to the Lincoln Avenue pumping station (the town's main pumping station), from two main interceptors, and is then transported via a 30-inch (762-mm) diameter force main to the Lynn Regional Wastewater Treatment Facility (LRWWTF), owned by the Lynn Water and Sewer Commission (LWSC). The town of Saugus and LWSC have an inter-municipal agreement that allows the town to pump 16.8 million gallons per day (mgd) (63,588 m<sup>3</sup>/d) of wastewater to the LRWWTF.

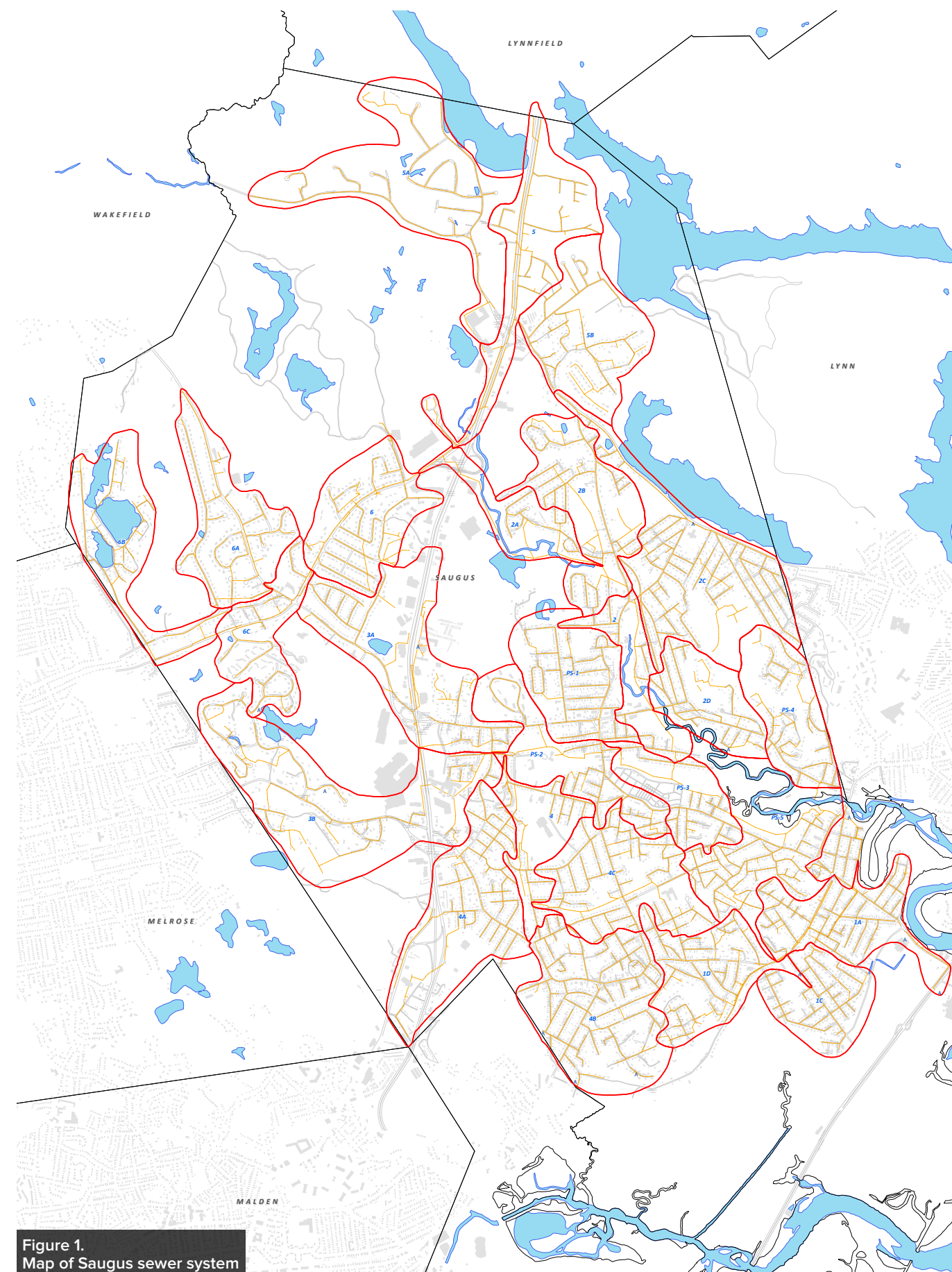


Figure 1.  
Map of Saugus sewer system

**THE PROBLEM**

The Lincoln Avenue pumping station receives all wastewater generated in the town of Saugus. The station has three centrifugal pumps with a design capacity of 17.4 mgd (65,859 m<sup>3</sup>/d), but flows are limited by the inter-municipal agreement with LWSC as mentioned above. The actual operating capacity of the Lincoln Avenue pumping station has fluctuated between 14 mgd (52,990 m<sup>3</sup>/d) and 16 mgd (60,567 m<sup>3</sup>/d) over the past few years. Any flows above this operating range must be bypassed to prevent station flooding, as well as SSOs and damage to private property.

As can be seen in Figure 2, dry-weather average daily wastewater flows (DWF) are between 4 mgd (15,142 m<sup>3</sup>/d) and 6 mgd (22,712 m<sup>3</sup>/d). However, during a 1-year, 6-hour storm (the design storm dictated by MassDEP), wastewater flows exceed 16 mgd (60,567 m<sup>3</sup>/d). Any storm event greater than a 1-year return period only further exacerbates the situation, forcing the town to either bypass these excess flows directly into the Saugus River or risk extensive damage to both the station and private property. The frequency of bypass events (i.e. overflows into the Saugus River) varied from one per year as in 2006, to as many as three events in 1998.

On April 12, 2005, the Saugus board of selectmen signed an administrative consent order (ACO) issued by MassDEP that required Saugus to address certain deficiencies in its sanitary sewer system. In addition, the town was also fined \$25,000 for past overflow

events. The ACO required that the town implement a high-flow management plan, set up a sewer bank, implement a private inflow removal plan, submit semi-annual reports to MassDEP, and develop a facilities plan to control SSOs.

**BASELINE CONDITIONS**

The objective of the facilities plan study was to develop and evaluate SSO abatement alternatives for the town's SSO discharges, and to present a recommended plan and implementation schedule for long-term SSO control to meet the regulatory agency's ACO requirements. A second objective, though not necessarily required by the regulatory agencies, was to extend the useful life of the town's system that, in some parts of Saugus, is nearing or exceeds 100 years of age.

The first step to put the town on a path to meet the ACO requirements was installation of 27 temporary flow meters (one for each subsystem), four permanent flow meters placed strategically throughout the collection system, three permanent rain gauges, and two permanent groundwater monitoring wells. This phase characterized the sewer system operations during wet weather conditions as baseline conditions. The data collected during the flow metering program was used to develop a dynamic hydraulic computer model of the sewer system using the Storm Water Management Model (SWMM) Version 5. SWMM is an Environmental

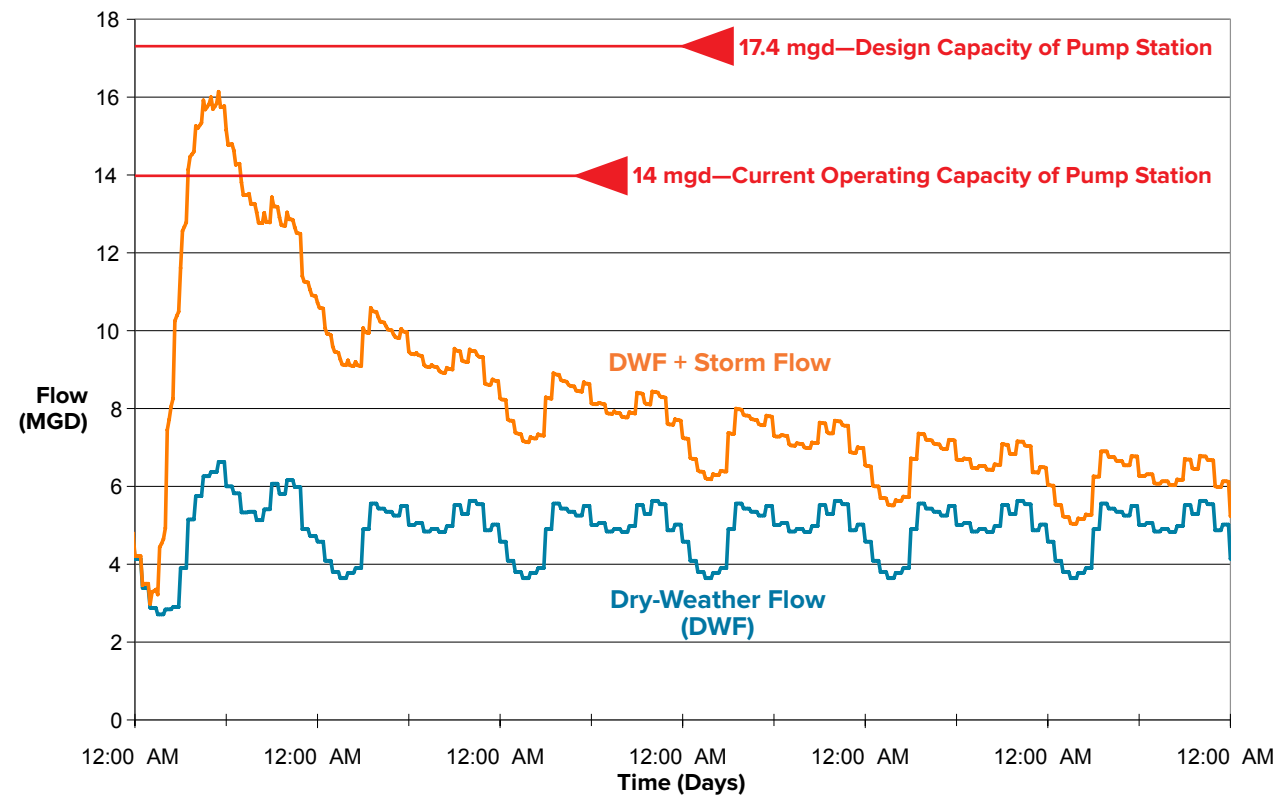


Figure 2. MassDEP design storm: 1-year, 6-hour storm (1.72 inches)

Protection Agency (EPA) model used in a variety of hydrologic and hydraulic applications and was selected because it can accurately simulate surcharging, overflow, and pump stations. The computer model was used to identify and quantify infiltration and inflow (I/I) and prioritize those subsystems with the highest percentages of I/I. This step was crucial to relate specific areas of flooding (SSOs) with sections of the collection system identified as having capacity issues. This also formulated a basis, or baseline, for the evaluation of alternatives that would ultimately reduce overflows in the system.

A sewer system evaluation survey (SSES) determined the causes of the excessive I/I. The SSES included typical collection system evaluations: smoke testing, dye water testing and flooding, closed-circuit television (CCTV) inspection, manhole “zoom” inspections, and a town-wide house-to-house inspection program that identified the locations of illegal private inflow connections to the sewer system. In addition, wet and dry weather infiltration were compared by conducting CCTV inspection of a few thousand feet of sewer lines during a large storm event in sections previously inspected by CCTV during dry weather. This inspection showed significantly more infiltration from defects that were previously observed during the dry weather inspections. More important, during the wet weather inspections additional defects with active infiltration were identified that had not been previously visible during the dry weather CCTV inspections. The SSES (i.e. the identification of the number and type of I/I sources) was used with estimated flows produced by each type of source to compare with the computer modeling results in order to create an accurate model of the sewer system during dry and wet weather events.

**SYSTEM CAPACITY ANALYSIS**

A range of design storms was input into the dynamic hydraulic computer model to simulate the effects of these storm scenarios on the wastewater collection system. Six-month, 1-year, 2-year, 5-year, 10-year, and 25-year design storms were simulated with the Lincoln Avenue pumping station operating at a typical capacity of 14 mgd (52,990 m<sup>3</sup>/d). Table 1 illustrates that, with increasing storm intensity, the sewer collection system becomes more and more surcharged, the quantity of SSOs upstream is multiplied, and the volume of SSO discharges increases.

Design Storm Return Period	Surcharged Pipes Upstream	Salt Marsh SSO	Lincoln Avenue Pump Station SSO	Quantity of SSOs Upstream	SSO Volume (mg)
6-Month	X			0	0.0
1-Year	X	X	X	2	0.7
2-Year	X	X	X	2	1.7
5-Year	X	X	X	3	7.2
10-Year	X	X	X	4	17.2
25-Year	X	X	X	8 +	23.4

In all modeled simulations the collection system is surcharged upstream of the Lincoln Avenue pumping station. During a storm event that has the probability of occurring once every year (1-year design storm), the model predicted an SSO in an environmentally sensitive salt marsh near the mouth of the Saugus River where the river discharges into Lynn Harbor. The model predicted that a 5-year storm (a storm event with a probability of occurring once every five years) triggers bypass pumping at the Lincoln Avenue pumping station to prevent station failure, with a total SSO overflow volume (including SSOs upstream of the station), of 7.2 million gallons (MG) (27,252 m<sup>3</sup>). During a 10-year storm event the model predicted that the total number of SSOs upstream increases even further with a total SSO volume exceeding 17 MG (64,345 m<sup>3</sup>).

**WHERE THE FLOW IS COMING FROM**

Inflow analyses were conducted on all flow data obtained during the flow metering program. The flow data represented the total flow in the system at a given point, including base wastewater flow (BWF), groundwater infiltration (GWI), and rainfall-dependent inflow and infiltration (RDII). The inflow analysis required that the RDII portion of the flow hydrograph be separated from the total flow to evaluate I/I due to storm events. To accomplish this, a software package (SHAPE) was used to quantify the amount of I/I by subsystem to prioritize the subsystems for implementation of SSO abatement technologies and solutions. In keeping with MassDEP's preferred method of analysis, a 1-year, 6-hour storm was used to determine peak flow (in gallons per day), or total overflow volume (in gallons) experienced by each subsystem. This peak flow and/or volume served as the basis for the subsystem ranking analysis that followed. Figure 3 ranks each of the 27 subsystems, left to right from least to greatest, based on the total RDII by volume during the simulated 1-year, 6-hour design storm. Most important, this figure illustrates that approximately 80 percent of

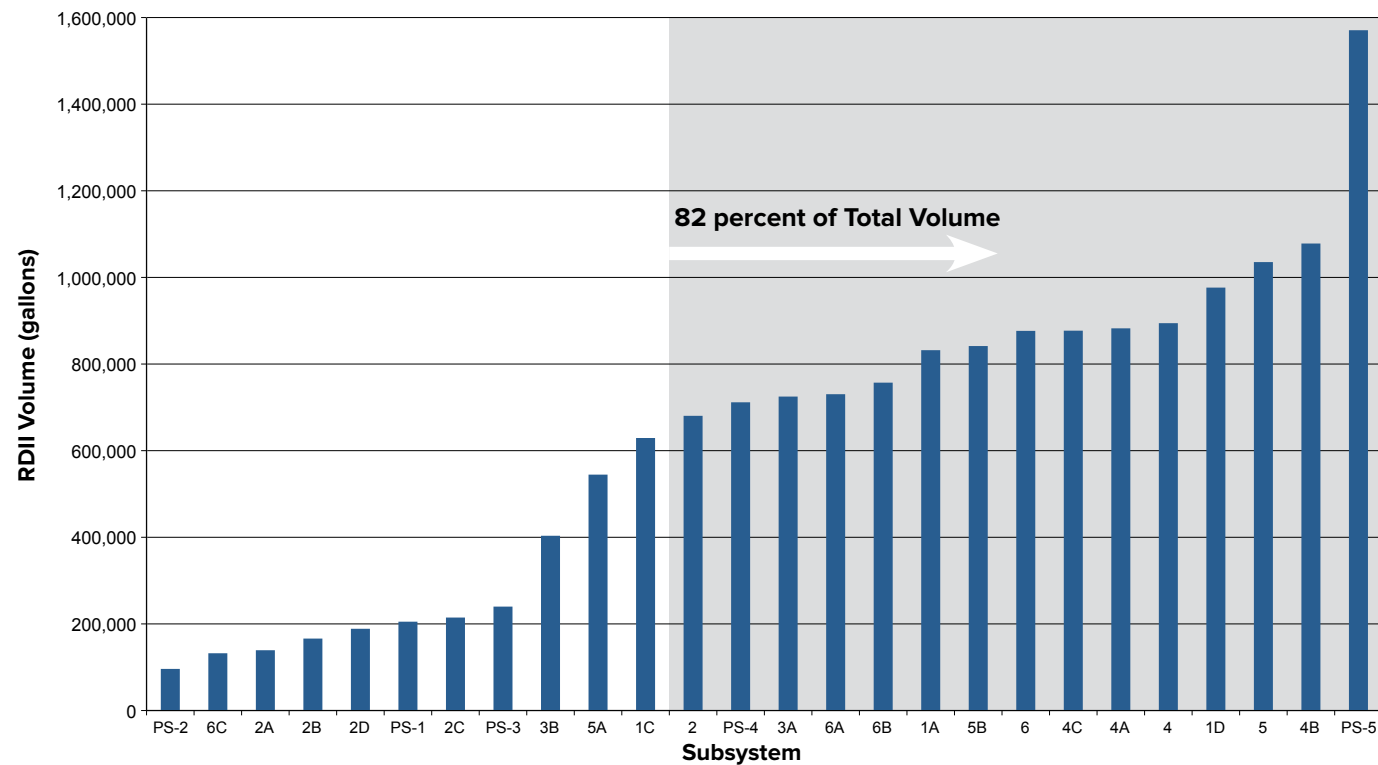


Figure 3. MassDEP 1-year, 6-hour storm—average spring condition—ranking of total RDII by volume

the total RDII within the collection system can be attributed to 15 of the 27 subsystems. The program focused on these 15 subsystems moving forward.

**LEVEL OF CONTROL**

Important in outlining the overall plan to reduce and/or eliminate SSOs was to determine the appropriate level of control to present to the regulatory agencies and upon which to base the recommended program. A level of control is the design parameter used to evaluate the magnitude of the rain event

that the ultimate solution would protect against (i.e. the return frequency of the storm that causes an SSO). Since the town's ACO did not explicitly define a level of control, an analysis was conducted that compared the amount of I/I removed by percentage, that would be required to eliminate SSOs based on various storm events. This percentage of I/I removed was then evaluated based on what was actually considered an achievable and affordable target.

Defining the level of control is important. Advising the town to remove a large percentage of I/I to reach a high level of control would only subject the town to costly I/I removal scenarios that may or may not be ultimately achievable. Specifying a lower level of control, which may be more easily achievable but not as effective, might, however, lead the MassDEP to force the town into a more effective level that would be both undesirable financially and not actually achievable.

Thus, the comparison of percent I/I removal to remaining SSO discharge volume began using the 10-year design storm, anticipating that proposing a recommended plan with a level of control of less than 10 years would not be accepted by the regulatory agencies. Figure 4 shows the comparison of the 10- and 20-year design storms with regard to percent I/I removal versus predicted SSO discharge volume. This figure indicates that 40-percent I/I reduction town-wide would eliminate SSOs in a 10-year design storm. However, a 60-percent removal rate would be needed to eliminate SSOs during the 20-year design storm. Based on experience with I/I removal projects using a "spot repair" approach in similar

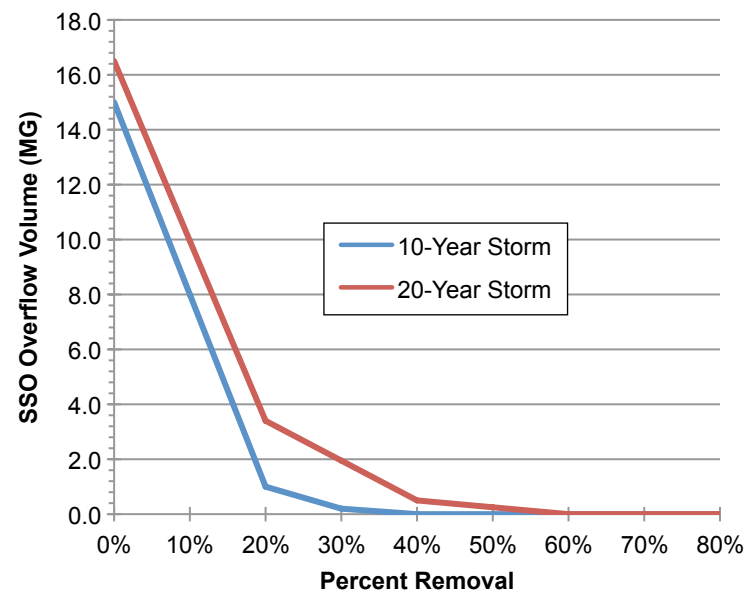


Figure 4. Percent I/I removal vs. SSO discharge volume

communities in New England and across the United States, removing 60 percent of the I/I from the system did not appear to be practically achievable. However, a removal goal of 40 to 50 percent of the I/I, while clearly ambitious, was thought to be reasonable and achievable through implementation of a comprehensive rehabilitation program.

**RECOMMENDED PLAN**

An SSO facilities plan evaluated several options to control SSOs. Potential SSO abatement alternatives were evaluated in compliance with state regulations and with consideration of the economic and environmental impacts. The study recommended comprehensive rehabilitation with a 40- to 50-percent I/I removal goal in nine critical subsystems over 10 years at a cost of \$32 million to achieve a 10-year level of control. The study determined that reaching this removal goal would remove 11 MG (41,635 m<sup>3</sup>) of I/I during a 10-year design storm. The plan included complete comprehensive rehabilitation of the public sewer system in the nine critical subsystems, as well as a town-wide private inflow removal program. The recommended plan included the following rehabilitation measures:

**Cured-in-Place Pipe (CIPP) Lining**—The most straightforward component of comprehensive rehabilitation is installation of CIPP lining of every foot of main line sewer within a given subsystem. To complete the design of this portion of the work, CCTV inspection is performed throughout the subsystem, and the videos are reviewed to determine the efficacy of lining the pipe with the traditional inversion process of CIPP lining the sewer. If a pipe cannot be lined due to a severely offset joint or broken pipe, the damaged segment must first be repaired with dig and replace methods prior to CIPP lining.

**Service Lateral Connection Lining**—A unique and relatively new technology, installation of service lateral connection lining from the main further reduces infiltration from entering the sewer system while also increasing collection system life. The service lateral liner seals the annular space between the service lateral and main line pipe that is created when the service lateral is reinstated after CIPP liner installation. The liner extends up into the service lateral and seals the first joint, which has proven to be a major source of inflow into the system. Experience has shown that the chemical grouts typically used to seal the annular space have a life expectancy of 5 to 10 years. Since the issues in Saugus were consent order driven, and since the recommended plan was spread out over 10 years, a more permanent solution was recommended by selecting a product that would have a design life comparable to that of the CIPP liner, which is approximately 50 years or more.

**Manhole Rehabilitation**—The lining of every manhole within a given subsystem using a monolithic cementitious liner is another straightforward component of comprehensive rehabilitation. However, two additional rehabilitation products were recommended to increase the service life of the structures. The first product was a flexible corbel lining system, which was recommended for manholes with mildly deteriorated corbels that showed signs of previous or active infiltration. This flexible liner allows the corbel to move and shift in response to freeze/thaw cycles and overhead traffic. The second unique product recommended for manhole rehabilitation was recycled HDPE-grade adjustment rings. These rings were used in lieu of traditional brick and mortar to rebuild corbels that had completely deteriorated. In addition to being sustainable (manufactured with curbside recyclables such as plastic milk cartons and shampoo bottles), the grade adjustment rings have a much longer design life, since they resist the negative effects of the freeze/thaw cycle, which wreaks havoc on traditional brick-and-mortar construction. The grade adjustment rings have also received rave reviews by subcontractors for ease in handling and installation.

**Private Inflow Removal Program**—The final and possibly most important element of comprehensive rehabilitation is implementation of a private inflow removal program. In Saugus, house-to-house inspection was conducted. The program inspected 9,200 properties (97 percent of all properties within the town) and identified 164 confirmed inflow sources to the sewer and 1,153 suspect sump pumps with flexible discharge piping. The latter were identified and pursued since the possibility existed that the flexible discharge piping could be redirected to a laundry sink or cleanout, thus contributing inflow into the sewer collection system.

To enforce the removal of these private inflow sources effectively, a new set of sanitary sewer by-laws was drafted that prohibited the direct connection of private inflow sources to the sewer and required redirection of directly connected sources and sump pumps with flexible discharge piping. Specifically, in the case of flexible hoses, the by-laws required that the discharge piping be a hard pipe that was permanently redirected outside the property. Furthermore, the by-laws stated that failure to comply with these regulations would result in a fine of \$50/day.

**PILOT PROGRAM**

The plan also recommended initiation of a pilot program to allow the project team to evaluate the effectiveness of the public and private comprehensive plan and to confirm whether the removal goals could be met prior to proceeding with the entire 10-year program. Service connections on

**Table 2. Pilot Program—Subsystem 4A—detailed cost breakdown**

Contract No.	Rehabilitation Type	Unit Cost in 2007 Dollars	Construction Cost in 2007 Dollars	Construction Cost in 2015 Dollars*
10-7	Cured-in-Place Pipe Lining	114.10	939,939	1,171,946
11-7	Service Lateral Connection Lining	1,990.75	796,300	992,852
12-7	Manhole Rehabilitation	1,127.21	191,626	238,925
<b>Total Cost</b>		<b>\$71.40</b>	<b>\$1,927,865</b>	<b>\$2,403,724</b>

\*Updated using ENR of 10037, July 2015

private property were intentionally not addressed in the pilot program in an effort to reduce costs and to properly evaluate the contribution of I/I from private service laterals.

The pilot program was initiated in 2007 in subsystem 4A and consisted of three construction contracts: (1) the lining of approximately 27,000 feet (8,000 meters) of mainline sewer pipe; (2) service lateral connection lining of approximately 400 service laterals; and (3) the lining and rehabilitation of approximately 170 manholes. The construction was completed in the winter of 2008 at a cost of \$1,927,865, or approximately \$72/foot (\$236/meter) of sewer rehabilitated. Table 2 breaks down costs for each contract in the pilot program.

In addition to the construction contracts for rehabilitation of the public sewer system, a private inflow removal program was piloted in subsystem 4A by first sending certified letters to every property within that subsystem that was identified as having an illegal inflow source as part of the house-to-house inspection program. The letter detailed the importance of the town's aggressive 10-year plan to comply with the ACO, and it explained what type of illegal source had been identified on the property and the means and methods by which this inflow source could be removed and/or redirected; it gave the property owner 90 days to comply with the new by-laws or begin facing a \$50/day fine thereafter. In all, 100 certified letters were sent to properties within subsystem 4A, and at the completion of the program 95 sump pumps and portable pumps were redirected for a compliance rate of 95 percent.

**VERIFICATION OF FLOW REMOVED**

Because of the inherent variability of year-to-year rainfall and I/I, a simple comparison of pre- and post-rehabilitation flows can be misleading. Thus, a linear regression analysis that evaluated RDII contributions before and after rehabilitation was used to verify how much I/I was actually removed as a result of rehabilitation in subsystem 4A, as well as to be able to report defensible I/I removal rates to the regulatory agencies. First, the pilot and control areas were re-metered to determine the total amount

of I/I removed in the rehabilitated subsystem. The control area was a subsystem upstream of (not tributary to) the pilot area in which no rehabilitation took place. This area was used to analyze antecedent groundwater conditions and other environmental factors that vary from year to year, to account for reduction in I/I that is not due solely to the rehabilitation performed.

The first step in the analysis was hydrograph decomposition, which separates the RDII from dry-weather flows for each storm event. Typical weekday and weekend dry-weather diurnal flows were determined for each flow meter. Then the dry-weather flow was subtracted from the total measured flow for each storm event to determine the RDII for each event. The RDII was used to calculate the R-value for each storm event for each subsystem. An R-value is defined as the fraction of rainfall over a subsystem that enters the sanitary collection system as RDII. High R-values indicate subsystems with high RDII, and low R-values indicate a relatively tight collection system.

Once R-values were computed for each rainfall event for each flow meter, a linear regression analysis compared the pre- and post-rehabilitation monitoring results. A regression analysis develops a linear relationship between the R-values of the rehabilitated subsystem and the R-values of the control area. This linear relationship was established during pre- and post-rehabilitation conditions by performing a linear regression between R-values of subsystem 4A and the control area during each monitoring period. To apply the method, the R-value for subsystem 4A was plotted against the R-value for the control area for each storm event for which there was data common to both areas (see Figure 5). A linear regression analysis then determined the line of best fit through the data points.

Slopes of the lines of best-fit indicate the similarity in the responses of the two subsystems. When the slope of the line of best-fit is close to 1, it indicates the two subsystems are responding similarly. As the slopes deviate from 1, it indicates the subsystems are responding differently. As can be seen in Figure 5, in 2008 the slope of the line of best-fit dropped dramatically after rehabilitation had occurred in

**Table 3. Percent removal for subsystems completed to date**

Year	Subsystem	Pre-Construction I/I Volume 10-Year Storm (million gallons)	Post-Construction I/I Volume 10-Year Storm (million gallons)	I/I Volume Removed 10-Year Storm (million gallons)	Percent Removed	Total Construction Cost*
2007	4A	2.200	1.100	1.100	50%	\$1,927,865
2008	5B	2.100	0.735	1.365	67%	\$ 409,734
2009	PS-5	2.900	1.500	1.400	47%	\$1,608,866
2010	6A	1.900	0.800	1.100	59%	\$1,692,906
2011	4C	2.000	1.020	0.980	49%	\$2,009,748
2012	6B	1.600	0.560	1.040	65%	\$ 318,637
2013	6	1.500	0.675	0.825	55%	\$1,237,420
<b>Total cost to date: \$7,195,428</b>		<b>Total cost/foot of sewer rehabilitated: \$75</b>				

\*Costs are based on the year of construction

subsystem 4A but not in the control area (subsystem 5B). Therefore, as expected, R-values are lower in subsystem 4A, but not in the control area for the same storm events.

The resulting reduction in RDII from the rehabilitation work in subsystem 4A compared to the control area was determined by the difference in the slopes of the best-fit lines (see equations 1 through 3).

Equation 1: $y_{(2005)} = m_1x + b$
Equation 2: $y_{(2008)} = m_2x + b$
Equation 3: $percent\ Removed = \frac{m_1 - m_2}{m_1}$
Equation 4: $\frac{0.57 - 0.29}{0.57} = 0.49 \sim 50\ percent$

Derived from the regression analysis described above, Figure 5, and equations 1 through 3, equation 4 shows how the percent reduction in I/I was calculated for the pilot area, subsystem 4A.

**CONSTRUCTION**

Based on results of the pilot program which showed a 50-percent removal rate in subsystem 4A, the town was advised to move forward with the recommended plan. Table 3 summarizes all construction projects completed to date with cost, volume, and percent of I/I removed based on a 10-year design storm for all four subsystems rehabilitated. The objective of removing between 40 and 50 percent of the I/I from subsequent subsystems to achieve a 10-year level of SSO control was achieved in the three subsystems completed after the pilot program.

**WARRANTY INSPECTIONS**

It was confirmed that I/I removal goals were being met before a recommendation to the town to move forward with comprehensive rehabilitation in

additional subsystems. Warranty inspections were initiated to ensure that the products chosen for rehabilitation were installed properly and were retaining their integrity. The contract documents specified that any defects observed during warranty inspections prior to the expiration of each product's 1-year warranty period would be repaired at no additional cost to the town. In addition, had any of these products not performed as expected, a different product could be recommended for subsequent rehabilitation contracts. Based on the warranty inspections the recommended products performed as expected—other than minor repairs to products not installed per manufacturer recommendation and subsequently exhibiting failure—and the desired inflow removal rates were achieved.

**CONCLUSIONS**

Achieving high percentages of I/I removal in sanitary sewer systems can be accomplished through comprehensive rehabilitation of the public system. This includes lining all mainline sewers, lining all service lateral connections from the main to the first joint, lining all manholes, and implementing a town-wide private inflow removal program.

Implementation of a comprehensive rehabilitation program can be successful in removing large percentages (43 to 65 percent) of I/I within a sewer collection system. The traditional "spot repair" approach to remove I/I assumes that all defects are visible in CCTV inspections. However, in sewer systems that exhibit large amounts of rainfall-dependent I/I, many defects may exist in sewers that cannot be seen during dry-weather CCTV inspections. Since not all CCTV inspections can be conducted during wet weather events, a comprehensive rehabilitation approach is the most effective

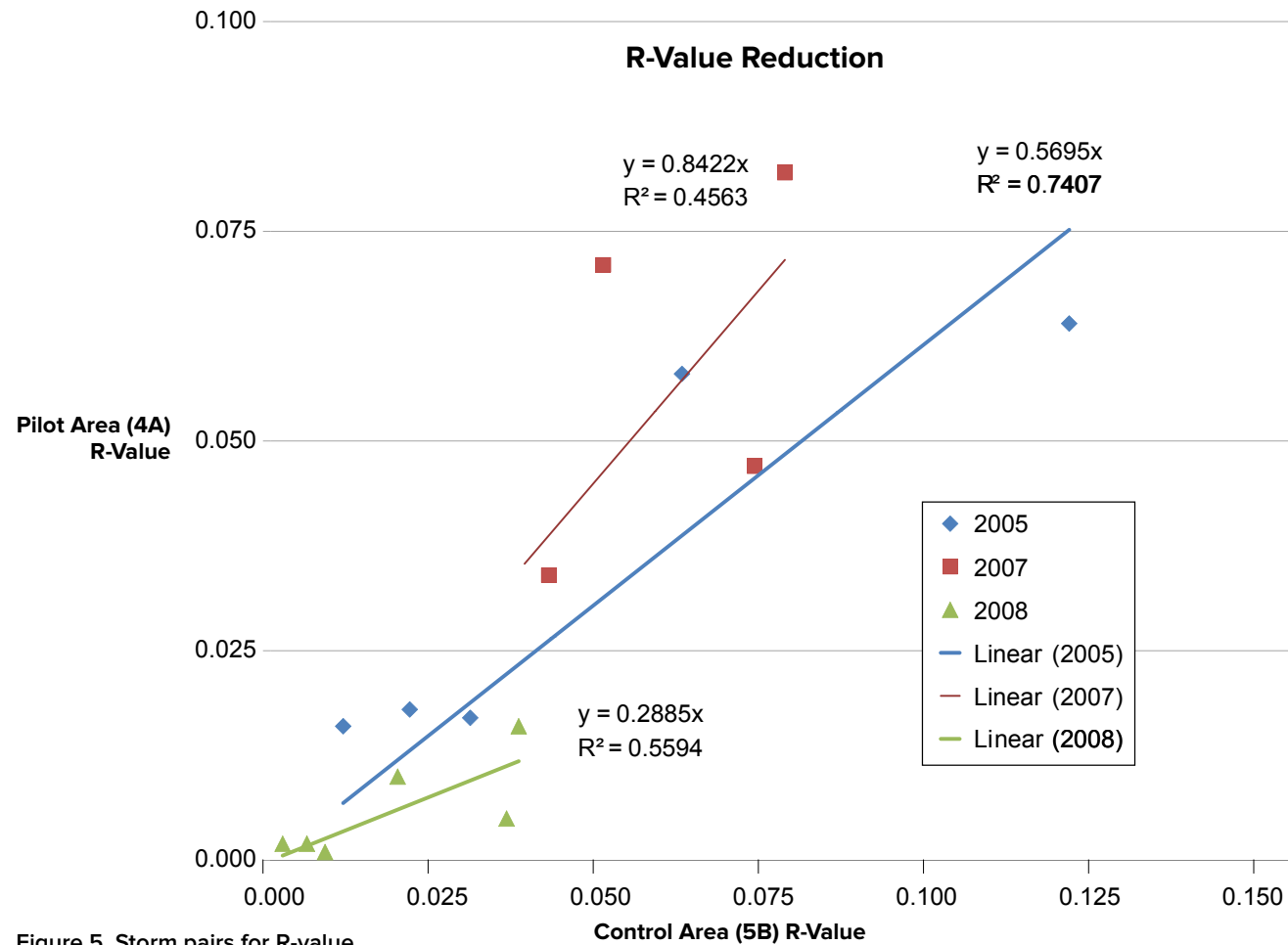


Figure 5. Storm pairs for R-value

way to correct all potential defects. This approach is especially important when facing an ACO, which requires a municipality to remove a large percentage of I/I by volume to achieve compliance. Finally, a detailed verification of how much I/I was actually removed based on rehabilitation measures is critical to definitively defend the rehabilitation approach to regulatory agencies. 🌱

**ABOUT THE AUTHORS**

• Jonathan Kunay, P.E., LEED®AP, served as project manager for Saugus's SSO program. He has worked in the civil/environmental consulting industry for 12 years on a variety of trenchless projects including cured-in-place pipe lining, manhole rehabilitation, service lateral lining, and facilities planning, including infrastructure rehabilitation and asset management. Mr. Kunay has his professional engineer's license in Massachusetts, and is also certified in NASSCO's Pipeline Assessment and Certification Program (PACP), Manhole Assessment and Certification Program (MACP), and Lateral Assessment and Certification Program (LACP).

• Paul Ross, a vice president with CDM Smith, has 32 years of experience in the planning, design, and management of wastewater collection, water distribution, drainage, treatment facilities, and major planning studies. His projects have included the design of large complex piping systems for wastewater collection and water distribution, drainage capital improvement programs, CSO separation and long-term control plans, facilities planning studies, I/I studies, sewer system evaluation surveys, pipeline rehabilitation, pumping stations, and wastewater treatment facilities.

• Brendan O'Regan, is the Director of Public Works in Saugus, Massachusetts. He has over 25 years of experience in the public and private sectors of the civil/environmental business. He holds a bachelor's and master's degrees in civil engineering.

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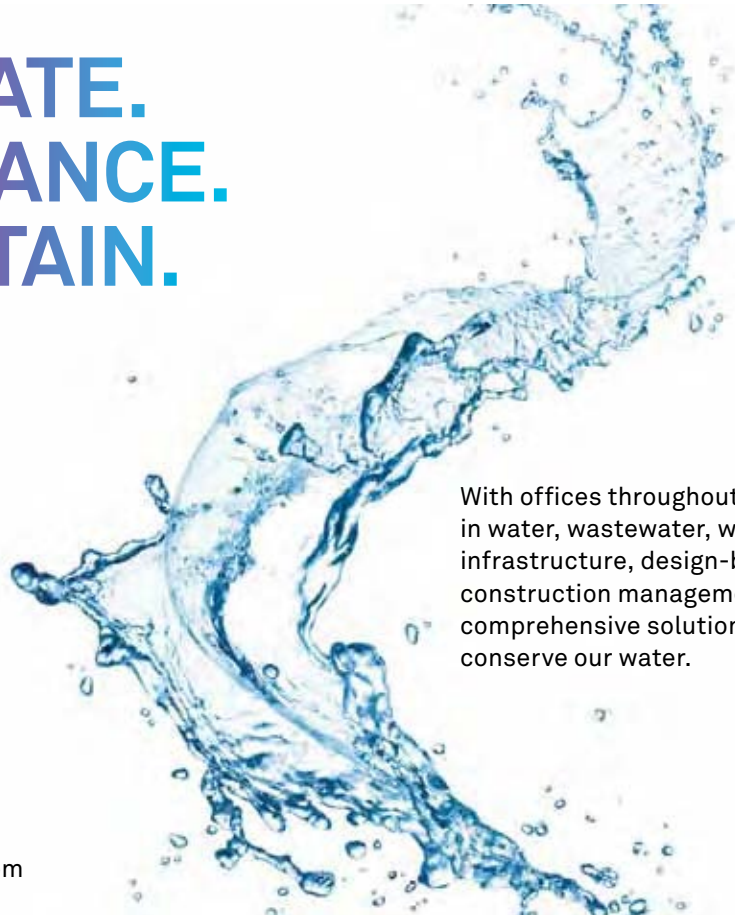
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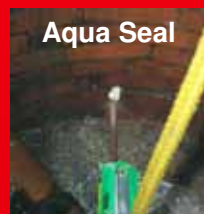
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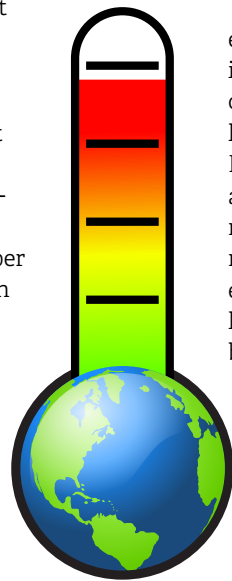
# Climate change forces a fundamental change of strategy—defense

by Ray Sirois, H2M Architects + Engineers

In the spring issue of 2009, NEWEA's *Journal* published its first article on climate change adaptation<sup>1</sup>. The article extrapolated the findings of the Northeast Climate Impacts Assessment and projected the results of that work on public works infrastructure in the northeastern United States. Outlined in it was how extreme-weather events had already negatively affected the built environment, and how important adaptation planning is for our local utilities and planning for new infrastructure expected to serve the next generations of New Englanders.

**M**uch has happened since 2009. There has been a significant number of events and developments (planned and unplanned), and new information has come out. This article will cover some of those developments, new information, and climate change events that relate to public works infrastructure over this period. Before covering that recent history, I would like to reflect on the past 50 years.

As a youngster who loved to go sailing out of Salem Harbor (Massachusetts) and Boothbay Harbor (Maine), I thought it strange how marinas and yacht club facilities would simply flush their wastewater directly into the ocean. High tide, low tide, it did not matter. I also remember smelling the Androscoggin River's stench while walking to elementary school in Lewiston, Maine. My dad explained that the Androscoggin River was one of the 10 most polluted rivers in the United States. Later, when visiting Washington, D.C., for the first time during my elementary school years, I also remember being told the same was true with the Potomac River, which meanders around our nation's capital. Of course, the history of these waterways changed after a bi-partisan effort led by Ed Muskie (D-ME). The Clean Water Act became law of the land, and a Republican president, Richard Nixon, established the Environmental Protection Agency (EPA).



The modern environmental movement was born. Today, of course, my son and I fish and canoe the Androscoggin River. On a trip to Washington, D.C. in 2011, I saw a large turtle sunning himself on a log sticking out of the Potomac River. This reptile "living large" on the Potomac is convincing evidence that society has largely succeeded in our huge clean-water initiative, and has done so all within our lifetime, for many of us.

When I traverse the two floors packed with exhibitors at NEWEA's annual conference in Boston, I am moved that all of us in this organization make our living because of that legislation that started in the early 1970s. Environmental legislation has been good for all of our utilities and businesses. NEWEA's membership is a clear example of how environmental legislation is good for the long-term economy, and certainly for our overall quality of life two generations later. I, for one, am proud to be a part of this industry and this success.

In a way, however, our 2009 article signaled that our environmental challenges were about to do a "complete 180." Prior to 2009, environmental initiatives had been designed to protect the *natural* environment by controlling development within the *built* environment, for instance, establishing emissions and discharge limits. Those initiatives all had conservation and protection of the *natural* environment as their primary goals. Today is a totally different game, however. When we look at climate change adaptation strategies, society is being forced to "play defense" with the natural environment.

More than ever, our planning and investments have to protect the *built* environment from an ever-changing and more-hostile *natural* environment! This is a fundamental change in thought and strategy.

Let us look at some of the more recent climate change adaptation-related events and developments since our last article on the subject:

- NEWEA Position Paper: Our organization has adopted this formal position paper on climate change and water resources, and it has been updated twice since it first came out in late 2009. The document makes some important assertions that all members should be aware of as we elect leaders, manage our businesses and utilities, and plan for the future.<sup>2</sup>
- June 2009: Severe precipitation events caused damage to infrastructure across northern New England.
- March 2010: Two severe precipitation events in Connecticut and Rhode Island caused losses, including a flooded wastewater treatment plant (WWTP) in Warwick, R.I.
- The Northeast Regional Climate Center goes live with updated precipitation data for planners and engineers, essentially updating traditional 1960s TP-40 intensity-duration-frequency analyses by incorporating storms for more-recent decades.
- May 2011: Flooding occurs at a water pollution control facility in Montpelier, Vt.
- June 2011: Multiple tornados strike in Massachusetts from Springfield to Sturbridge.
- August 2011: Tropical storm Irene causes \$15 billion damage to infrastructure, much of it here in New England and upstate New York.
- November 2011: The New England Water Works Association held an extreme-weather events workshop. There have been several other seminars on climate change adaptation, including Antioch College's Michael Simpson event, the Environmental Protection Agency event in Manchester, N.H., last May, and a Maine Department of Environmental Protection event held this past December.
- Summer 2012: Nuclear power plant in Connecticut has to shut down as seawater in Long Island Sound rises to 75°F—too high to cool the plant.
- June-Aug 2012: Wildfires rage across the United States, mostly in the West, but also in Florida. (When it comes to water resources, New England has challenges that differ from other regions.)
- Oct 2012: Superstorm Sandy causes \$65 billion in damage, 233 deaths, a record 13.1-foot storm surge in Long Island Sound as measured in Bridgeport, Conn., and 11 billion gallons of wastewater discharged on the East Coast, mostly from New York and New Jersey.

- May 2013: Damage from extreme precipitation in northern Vermont was pictured in NEWEA's Fall 2013 *Journal*.

**Our planning and investments have to protect the *built* environment from an ever-changing and more-hostile *natural* environment! This is a fundamental change in thought and strategy.**

- NEWEA's Fall 2013 *Journal*: Ogunquit, Maine, evaluates climate change adaptation options with sea-level rise (SLR).
- September 2014: EPA releases *Flood Resilience—A Basic Guide for Water and Wastewater Utilities*.<sup>3</sup>
- April 2015: President Obama issues Executive Order 11988 requiring federal agencies to avoid, to the maximum extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of flood plains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Specific guidelines are given.

## Warwick Sewer Authority

To highlight one of these events, the Warwick Sewer Authority had significant flooding of its collection system during the week of March 15, 2010. Three pump stations were significantly affected, totaling \$50,000 of damage. The Knight Street pump station (see photo on page 44), can operate underwater on generator power and has had to multiple times. Fortunately, the protective levee (also pictured), which protects the Warwick wastewater treatment facility (WWTF), kept the Pawtuxet River out of the treatment plant area. One critically difficult adaptation decision for any utility is where to draw the line with how much protection is needed to protect from SLR or flooding from inland waterways. All indications on this March 15–16, 2010 storm were that this levee system was adequate.

Only 2 weeks later, however, on March 30, 2010, after an 8.8-inch, 24-hour precipitation event, nearby Interstate







Warwick Sewer Authority's Knight Street pump station can operate underwater



This levee, which protects the Warwick WWTF, was breached on March 30, 2010, flooding the treatment plant area

95 flooded and had to close, and that afternoon the same levee protecting the WWTF breached, and the plant flooded. Total damages from this second event were 300 times higher than the first, totaling \$15 million. Most of this damage was covered by insurance and Federal Emergency Management Agency (FEMA) funds. The city of Warwick is planning to

**Ultimately, society needs a new, more-renewable energy mix to minimize carbon emissions, which contribute to climate change. That is the new offense for us and the next generations.**

upgrade the levee system to handle a 500-year flood, essentially raising the line of protection to prevent this event from happening again. This event elevated public awareness of Warwick Sewer Authority's importance, and brought them into the fold with regard to local emergency management.

Warwick's advice? "Plan for the worst." It is important to be proactive, engage training, ask for help, network within the city's emergency-action planning as well as with surrounding communities. Warwick is much better prepared today, and has been generous with lessons learned about its story.

**Planning for rising water levels**

In Maine, the Ogunquit Sewer District continues its adaptation planning to identify planning-level costs associated with relocating the WWTF to a new location off the barrier beach or with regionalizing with its neighbor (the Wells Sanitary District). Ogunquit's recent efforts were presented at NEWEA's 2015 Annual Conference (Session 30).

Ogunquit is not the only utility in New England engaging in risk assessment of SLR and storm surge.

To the north, South Portland's WWTP has been analyzing the most recent tide-gauge measurements across Portland Harbor. Tide-gauge data from that location have been available for more than 100 years, but tide data from recent years have already exceeded, at times, the high emissions projected for SLR in Casco Bay. As a result, utility managers envision the need for a dike and berm around the perimeter of the WWTF at an elevation of 17 feet to protect structures built to withstand the 100-year flood elevation of 13 feet.

Other adaptation measures such as a 66-million-gallon-per-day (mgd) effluent pump will also likely be needed. Analysis of the plant hydraulics indicates the existing concrete wall may likely succeed to keep the sea water out for a 100-year storm with 20 more years of SLR. Beyond that, however, if peak flows, high tide, and a storm surge happened at the same time, the plant would be likely to flood *from the inside*. Flooding would come from its own effluent because of the added static head loss of the WWTF outfall pipe due to the higher receiving waters beyond the wall surrounding the plant. While the projected SLR and storm surge might not happen within the next 20 years, the data shows it is possible in the 20- to 30-year planning period. For this reason, both a higher wall and the effluent pump have been included in the WWTF's facility plan upgrade. This case study was also presented at NEWEA's 2015 Annual Conference (Session 20).

South Portland's would not be the first coastal WWTP in New England to find effluent pumping necessary. Old Orchard Beach and Ogunquit, Maine, and Glastonbury, Conn. plants already can do this when necessary during high flows and tides. Construction is underway at the Mattabassett District WWTP in Cromwell, Conn., to add this capability.

**Updating precipitation data**

Just as good tide-gauge data are important, so too are good precipitation data in performing risk assessments and infrastructure design. No one would use a 55-year-old traffic study to design a new roadway or intersection. Yet with precipitation analysis, some are still doing it with TP-40, the authoritative 1960s-era document that defined precipitation frequency and duration. A 24-hour, 100-year precipitation event, as defined within that document, is happening in many places around New England with much more frequency than the 1 percent chance that such an event is supposed to occur in any given place or year.

Regarding precipitation and storms, stationarity—a mathematical or statistical way to historically assess precipitation and storm impacts—is "dead." We cannot use outdated historical data to predict our future. Knowing that there was no plan to update the 1960s-era TP-40 intensity-duration-frequency analysis, the NRclimate change at Cornell University obtained funding to add more recent decades of rain-gauge data to that traditionally authoritative work. The result is a website at <http://precip.net> where any location in New York or New England can be specified to get the best available, up-to-date, historical precipitation data. This data can be input into hydrology modeling software such as WinTR-20 or others that take ASCII format as an input.

As reported at this website, "The design of the site and its products have been reviewed by stakeholders with the U.S. Natural Resource Conservation Service (NRCS), various state agencies, and private engineering consulting firms. The site includes estimates of extreme rainfall for various durations (from 5 minutes to 10 days) and recurrence intervals (1 year to 500 years)." This dynamic, ongoing research represents new information and is an important development since our article in 2009. Today, it is a standard resource for projects in the northeastern United States. This online information resource is free and available to all planners and engineers, and its information may be of interest to the public.

**Conclusion**

Our economy seems to influence a debate for some as to the cause of why we must play defense with our infrastructure planning. Ultimately, the debate does not matter—it is clear. We need to protect both our natural environment *and*, now, our built environment from a changing climate. Ultimately, society needs a new, more-renewable energy mix to minimize carbon emissions, which contribute to climate change. That is the new offense for us and the next generations.

In this article, we have shown how we also need to beef up our defense to protect our public works infrastructure from an ever-changing natural environment.



The flooding of the Warwick WWTF on March 30, 2010, resulted in \$15 million in damages

**NOTES**

1. Reprint of the author's Spring 2009 NEWEA *Journal* article ([nrcm.org/documents/NEWEAreprint\\_climatechange.pdf](http://nrcm.org/documents/NEWEAreprint_climatechange.pdf))
2. NEWEA Position Paper on Climate Change ([newea.org/wp-content/uploads/2014/03/CLIMATE-CHANGE.pdf](http://newea.org/wp-content/uploads/2014/03/CLIMATE-CHANGE.pdf))
3. Flood Resilience—A Basic Guide for Water and Wastewater Utilities ([water.epa.gov/infrastructure/watersecurity/emerplan/upload/epa817b14006.pdf](http://water.epa.gov/infrastructure/watersecurity/emerplan/upload/epa817b14006.pdf))
4. WEF Paper submitted on Warwick WWTF flood event ([warwickri.gov/pdfs/wsa/floodmitgation/WEF%20Manuscript%20Warwick%20Flood.pdf](http://warwickri.gov/pdfs/wsa/floodmitgation/WEF%20Manuscript%20Warwick%20Flood.pdf))

**RESOURCES**

- Emergency Response Table Top Exercises ([water.epa.gov/infrastructure/watersecurity/climate](http://water.epa.gov/infrastructure/watersecurity/climate))
- The Northeast Regional Climate Center—Cornell University ([nrcc.cornell.edu](http://nrcc.cornell.edu))

Ray Sirois is the IT Director for H2M Architects + Engineers.

The author wishes to thank Ed Leonard and David Cockburn (Wright-Pierce) for their help in reviewing this article.



# NEBRA Highlights

Lystek transfer to spreader

## New sewage sludge incinerator rules take effect on March 16, 2016—What have New England states done?

In April, 2015, the U. S. Environmental Protection Agency (EPA) published a proposed plan for federal standards for sewage sludge incinerators (SSIs) under the Clean Air Act Sections 111 and 129 ([epa.gov/airtoxics/129/ssi/ssipg.html](http://epa.gov/airtoxics/129/ssi/ssipg.html)). In that 2015 action, EPA proposed that SSIs in any state that has not developed emission guidelines for existing SSIs will need to implement the guidelines by EPA from its initial March 21, 2011 regulatory action, including the SSI maximum achievable control technology (MACT) standards.

Despite legal challenges by the National Association of Clean Water Agencies (NACWA) and others, the 2011 SSI MACT standards and rule implementation has continued. In 2013, a U.S. Court of Appeals upheld the rule and its MACT standards but required EPA to review the background and supporting documentation. NACWA had filed a parallel

challenge to the parallel EPA rule that defines incinerated sewage sludge as solid waste. On June 3, 2015, a U.S. Court of Appeals denied that action, further clearing the way for EPA to enforce the new SSI regulations on schedule.

As detailed in the original 2011 rule, each SSI must comply with the new emissions guidelines “as expeditiously as practicable after approval of the state plan, but no later than 3 years from the date of approval of a state plan or 5 years after the promulgation” of the new rule by EPA. Thus, the deadline for compliance with the SSI air emissions standards remains March 21, 2016. According to the proposed April 2015 action, “if an SSI does not achieve final compliance by March 21, 2016, the proposed federal plan requires the SSI to shut down by March 21, 2016, complete the retrofit while not operating, and be

in compliance upon restarting. An SSI that operates out of compliance after the final compliance date would be in violation of the federal plan and subject to enforcement action.”

In 2011 and 2012, New England states and New York responded to the new SSI emissions regulations in various ways:

- Maine and Vermont submitted negative declarations to EPA, stating that they have no SSIs and do not require any related regulatory program. EPA accepted these negative declarations in March 2014.
- Connecticut, Massachusetts, and New Hampshire did not submit state plans and have indicated that they will accept delegation of the federal plan (the plan being proposed in 2015).
- As of April 2015, EPA had not received a negative declaration or state plan from Rhode Island.
- New York has submitted its final state plan and is expected to receive delegation soon.

Meanwhile, EPA notes in its April 2015 action that it “is evaluating the court’s decision and intends to address its remand in a timely manner. However, the court’s remand requires EPA to provide additional explanation of several aspects of its MACT floor calculations in the SSI rule, and the agency’s response to the decision may require further evaluation of those calculations. In the meantime, the agency believes it is appropriate to propose the federal plan at this time because the SSI rule remains in place following the court’s decision, and the federal plan is needed to implement the rule in states without an approved state plan.”

The new SSI regulations also require specific operator training by March 21, 2016. In April, the Water Environment Federation (WEF) hosted the first such training, providing for approval of

several SSI operators in Virginia. According to WEF:

“The training provided a rigorous curriculum that began with a historical perspective. Jim Welp provided a look back at 1993 and compliance with 503 regulations, from the installation of THC monitors and implementation of NOx studies to meeting emission limits, noting that the pretreatment program has been a great success story.... Bob Dominak detailed the background, requirements, legal, and implementation issues associated with the rule. He provided answers to questions, such as, “do the emission guidelines, new source performance standards, and operating limits apply during startup, shutdown and malfunctions?” [The answer is yes]. Additional information was imparted, such as SSIs are required to meet not only the SSI MACT standards, but also other applicable requirements, such as Title V, Part 503, state and local operating requirements, among others....”

Contact Patrick Bird, EPA Region 1 (New England) for the SSI regulation.

### And what about biosolids burned as an alternative fuel?

The new SSI MACT standards probably do not apply to dried biosolids used as an alternative fuel in, for example, a cement kiln. As Chris Hornback of NACWA explained: “The SSI MACT requirements apply only to SSIs. If a cement kiln chooses to burn biosolids that have not been excluded from the solid waste regulation, the appropriate MACT standards for kilns burning solid waste would apply—not the SSI MACT requirements. The petition process has been used successfully... where renewable energy standards are driving interest in biosolids as a green fuel.... The petitioners were able to demonstrate that the sludge had been processed sufficiently to meet the legitimate fuel conditions. The contaminant levels remain the biggest concern, but in these cases they were able to show low enough contaminant levels to be comparable to coal and qualify as a legitimate fuel.”



The Mattabassett District in Connecticut is celebrating completion of air-emission upgrades, including a new fluidized bed incinerator. The plant has complied with the new MACT standards, almost a year before the deadline.

### Massachusetts agencies discuss biosolids, organic residuals, and nutrients

It has been a curious, busy year regarding biosolids and residuals regulation in Massachusetts. In recent years, under Governor Deval Patrick, MassDEP and sister agencies steadfastly advanced organics recycling, mandating the beginning of diversion of food scraps from landfills. The interest in composting and anaerobic digestion skyrocketed, and many new projects are in development.


In the midst of that, biosolids stakeholders, including NEBRA, have begun to push MassDEP to update the state’s “sludge” regulations, most of which date back to the 1980s. In June, NEBRA produced a workshop on the science and risk assessment of molybdenum (Mo) in biosolids applied to soils. A follow-up letter to MassDEP urged a change to the anomalously low Mo standard in the 310 CMR 32.00 sludge regulations. At press time, MassDEP was updating its risk assessment and considering options. NEBRA continues to collaborate with stakeholders in encouraging MassDEP to improve the regulations so they protect public health and the environment and are based on

current science that recognizes the benefits of properly managed biosolids recycling.

This is a difficult time, however, as MassDEP has experienced a number of staffing cuts and early retirement offers. At the end of June, for instance, MassDEP lost long-time biosolids program expert Cheryl Poirier and compost expert Sumner Martinson.

Meanwhile, a sister agency, the Department of Agricultural Resources (MDAR), published final fertilizer regulations that some see as confusing, counterproductive, and impossible to enforce. The regulations, which were drafted and published for comment in 2014, aim to curb phosphorus non-point pollution, especially from agriculture and turf (lawns) as part of negotiated total maximum daily load (TMDL) agreements for impaired watersheds. The Legislature passed a law in 2012, mandating the regulations, and MDAR had to get them done quickly. When the final regulation (330 CMR 31.00) was published in June, MDAR had provided no response to comments and it was unclear whether many comments (including from NEBRA) were considered.

Announcing...  
**The NEWEA/NEBRA Northeast Residuals and Biosolids Symposium**  
 Is now part of BioCycle REFOR15  
 Symposium Oct. 19 (and more Oct. 20 – 22)  
 Doubletree Boston North Shore—Danvers, MA  
 NEBRA's Membership Meeting will be held on  
 October 19, before the Symposium  
 Details abstracts & registration: [BioCycleREFOR.com](http://BioCycleREFOR.com)




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NEBRA has gathered further information on the new fertilizer regulations, to better understand their intent. Their basic premise seems to be that no material containing phosphorus (P)—including fertilizers and composts and biosolids—can be applied to agricultural sites or non-agricultural sites (e.g. turf) unless a soil test demonstrates the need for added phosphorus. In some places, however, the regulation appears to exempt organic amendments, such as biosolids; when asked about it, the regulation's author said MDAR did not intend to disrupt the use of organic residuals. Yet in other parts of the rule, the prohibition appears to apply across the board.

Mass Farm Bureau Federation, the Natural Resources Conservation Service (NRCS), and other organizations—including NEBRA—are concerned about the new fertilizer regulation and how it was rushed through. NEBRA is working with these stakeholders to find a way forward that respects the various needs and results in a rule based on sound science.

**Biosolids coverage in Treatment Plant Operator**  
*Treatment Plant Operator (TPO)* covers biosolids management, and over the past few years has published articles and editorials that strongly support biosolids recycling and resource recovery. To read more, search for "biosolids" at ([tpomag.com](http://tpomag.com)) Topics include the following:

- Marketing biosolids (information from a WEF webinar)
- "Spreading the Word," an article about Chicago's biosolids field days



Lise LeBlanc in the pages of *Treatment Plant Operator*

- Communications & outreach (Denver's former public information officer)
  - "What's all the Fuss," a Northwest perspective on biosolids public acceptance
  - "Peak Phosphorus and the Role of Biosolids" The Metro Vancouver (BC) biosolids program (June, 2015 cover story).
- Numerous NEBRA members' biosolids programs have been highlighted:
- "Garden Ready" discusses the Stowe, Vt. Class A biosolids program.
  - Quasar energy group discusses lessons learned in public outreach in "Biosolids Battle."
  - The N-Viro Canada (Walker Environmental Group) Thorold, Ontario facility was covered.

The August 2015 issue included six articles and an editorial on biosolids, including discussions on the new digesters at Fairhaven, Mass., and the Mechanic Falls, Maine biosolids program and environmental management system, as well as an interview on marketing biosolids to farmers with NEBRA Board member Lise LeBlanc.

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**In brief**

**Canada updates compost quality standards.** According to Susan Antler, director of the Canadian Compost Council ([compost.org](http://compost.org)), the changes were developed by consensus of a committee of experts and include small to moderate tweaks, including to the allowable levels of foreign matter, trace element limits for lead (Pb) and molybdenum (Mo), and E. coli. A new, fourth compost maturity test is included in the revised standards; this test was developed by Paul Arnold of Acadia University and is the first such test developed in Canada.

**Biosolids opponents are using arguments about prions to raise public concerns of wastewater and biosolids.** Prions are infectious, twisted proteins associated with bovine spongiform encephalopathy (BSE), also called "mad cow disease." Prions are also associated with scrapie in sheep and the human Creutzfeldt-Jakob disease. NEBRA believes there is no evidence that biosolids are a source or transmitter of infectious prions.

**WERF completes major project on energy flows and efficiency at water resource recovery facilities.** A Guide to Net-Zero Energy Solutions for Water Resource Recovery Facilities (WRRFs) was published in June.

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## Vermont State Director Report

by Nathan Lavalley  
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The Green Mountain Water Environment Association (GMWEA) has been busy, with activities including a successful legislative lunch, a well-attended spring meeting, a night at the ball park, a movie screening of “What’s Your Watermark?” and planning for the annual golf tournament.

### Government affairs

The GMWEA Government Affairs committee made great headway, testifying before the Legislature on several key bills. The committee also held a fruitful meet and greet at the State House, and hosted an effective legislative lunch.

Bill H.35 (now Act 64) was signed into law by the governor. The bill provides new regulation, enforcement, and technical guidance for farmers and municipalities to assist in reducing the amount of phosphorous flowing into Lake Champlain.

The “Microbeads Bill” (H.4) passed through the House with a 140-0 vote but did not make its way completely through the Senate this session. The bill would ban the manufacture of these beads by Dec. 31, 2017, and in the following year the bill would ban the sale of personal care products containing microbeads.

### What’s is your watermark?

I attended the screening and round table for “What’s Your Watermark?” This stimulating public education film offers the viewers several resources for recognizing and improving their impact on water quality. For more information, visit [WhatsYourWatermark.com](http://WhatsYourWatermark.com).

### GMWEA Spring Meeting

The Spring Meeting was held at the Killington Grand Resort on May 21, 2015. This year’s lunch-time speaker was Ernie Kelley, program manager for the wastewater section at the Vermont Department of Environmental Conservation. Ernie provided an update on the Lake Champlain total maximum daily load (TMDL) process. Bruce Hoar and Mike Barsottie were re-elected to the GMWEA board of directors, and during the business meeting, Ray Willis provided an update on NEWEA events and opportunities.



NEBRA’s Ned Beecher makes a presentation at the Green Mountain Water Environment Association’s spring meeting



NEWEA President-elect Ray Willis re-presents the NEWEA Utility Management Achievement award to staff of the Montpelier facility (l-r) Bob Fischer, Matt Lamson, Chris Cox, and Devlin Hoagland

### Vermont State Science and Math Fair/Stockholm Junior Water Prize

GMWEA board members judged the work of some outstanding students, and selected the Vermont Science and Math Fair winners and also the Stockholm Junior Prize winner on March 28, 2015, at Norwich University.

### NEWEA Spring Meeting

June 7–10, 2015, Along with GMWEA President Chris Robinson, I participated in the NEWEA Spring Meeting at the Mount Washington Resort in New Hampshire.

### GMWEA Golf Tournament

Almost 100 players and sponsors teed off at the George Dow Memorial Golf Tournament at the Cedar Knoll Country Club in Hinesburg on Aug. 21, 2015. The proceeds help fund a GMWEA scholarship in the name of George Dow, our old friend and past NEWEA director.

### GMWEA activities

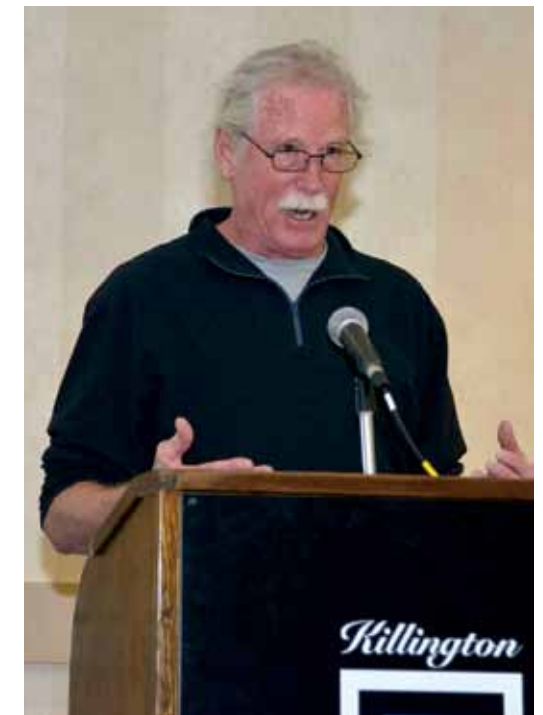
On May 27, 2015, GMWEA Past President Bob Fischer, board member Erik Bailey, Richmond chief operator Kendall Chamberlain, and I won the first-place trophy in the LCI Governor’s Cup Fishing Tournament.

### World Water Monitoring Day

Once again, GMWEA gave out 100 World Water Monitoring student test kits to Vermont educators to encourage participation in the World Water Monitoring event.

### Upcoming events

The GMWEA fall trade show will take place in Burlington on Thursday, Nov. 5, 2015. Vermont will host the Maine exchange operator during this time. Please come and join us for a day of camaraderie, excellent technical sessions, and a ballroom full of exhibitors displaying every imaginable product in the water environment.

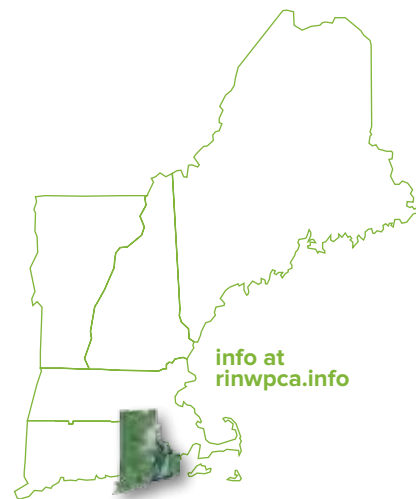


Vermont DEC’s Ernie Kelley gives the keynote address at the spring meeting



## Rhode Island State Director Report

by Michael Spring  
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### Legislative affairs luncheon

On March 25, 2015, Narragansett Water Pollution Control Association (NWPCA) held a legislative luncheon in Providence at the Renaissance Hotel across from the Rhode Island State House. The



(l to r) Susan Sullivan, Thomas Borden, Fred Presley, Janine Burke (master of ceremonies), Janet Coit, Walter Burke, Matthew Formica (NEWEA president)

purpose of the luncheon was to discuss current and future issues affecting water, wastewater, and stormwater infrastructure in Rhode Island. The session was to inform and educate legislators about water issues important to Rhode Island communities. The speakers and respective topics were:

- **Susan Sullivan**, New England Interstate Water Pollution Control Commission (NEIWPC)—congressional bills
- **Thomas Borden**, program director, Narragansett Bay Estuary—the improving health of Narragansett Bay
- **Fred Presley**, town manager, West Warwick—budget challenges
- **Janet Coit**, director, Department of Environmental Management—working closely with legislators and the wastewater community
- **Walter Burke**, director, Town of Bristol—re-designing beach landscape to minimize beach runoff and closures due to high fecal coliform from water fowl

### 2015—The year of training

NWPCA has committed 2015 as the year of training. Our training committee has successfully scheduled and completed three wastewater classes. These classes have been approved by the state of Rhode Island for training contact hours that can be submitted and applied to wastewater licenses. The classes were: **“Blueprint Reading for Sewer Collection Systems,”** by Atlantic States Rural Water & Wastewater Association, Diane Johnson, P.E.; **“Clarifier Evaluation and Upgrade Techniques,”** by John K. Esler, president, Clarifier Performance Evaluations, Inc./Clarifiers, Inc.; and **“Basic Microbiology,”** by biologist Nora Lough of the Narragansett Bay Commission

### Upcoming training— Find your Bacteria Sources

Source Molecular is hosting a 20-minute microbial source tracking webinar presentation. The Source Molecular laboratory provides testing that can help to identify the sources of fecal contamination in water bodies. The presentation will include microbial source tracking (MST), a tiered approach to detecting fecal sources, use of the newest U.S. Environmental Protection Agency (EPA) patented/developed methods for MST, and use of MST as a support for total maximum daily loads (TMDL), stormwater management, CSO, MS4 permits, and beach monitoring.

Emergency Response training will be on Sept. 30, 2015. The event will consist of a seminar with presentations and a tabletop exercise (TTX). The seminar presentations will cover topics related to Rhode Island Water & Wastewater Agency Response Network (RIWARN), as well as water and wastewater preparedness and response. The TTX will be based on a hypothetical incident to bring together water, wastewater, county, and state agencies, and public safety to discuss roles

and responsibilities. This seminar and TTX are open to member and non-member utilities, as well as response partners interested in learning more about RIWARN.

NWPCA members have been invited by the New Hampshire Department of Environmental Services to participate in a Process Control & Optimization class on Oct. 20-21, 2015, at the Susan N. McLane Audubon Center in Concord, N.H. Instructor Eric Wahlberg, P.E., Ph.D., will present training that will give activated sludge front-line supervisors and operators, and process control operators and engineers, a greater understanding of the activated sludge process. With this understanding, effluent quality variability and process energy usage can be reduced.

### Annual awards banquet

At its annual awards ceremony on April 30 at the Potowomut Golf Club in Warwick, NWPCA recognized numerous Rhode Island wastewater treatment facilities and operators for outstanding achievements. Jay Pimpare from EPA and Ray Willis, president-elect of NEWEA, re-presented awards to Rhode Island operators and treatment facilities originally bestowed at the NEWEA Annual Conference in January. Mr. Willis also recognized the Narragansett Bay Commission for the Water Quality Improvement award from the Water Environment Federation (WEF) for demonstrated results of its combined sewer overflow project. This award was accepted by Carmine Goneconte Superintendent of NBC Bucklin Point WWTP. Individual awards are as follows:

- **Janine Burke** of the Warwick Sewer Authority received the Alfred E. Peloquin award for contributions to the wastewater operations profession.
- EPA recognized the town of **New Shoreham’s wastewater treatment facility** with an Operations and Maintenance Excellence award.
- EPA presented the Industrial Pretreatment Program Excellence award to **David Gaipo** of United Water.
- **Shawn Murphy** of CH2M was named NEWEA Operator of the Year for his work at the Woonsocket treatment facility.

Other awards were given out by the Narragansett Water Pollution Control Association:

- Most Efficient Small Secondary Treatment Facility, Town of **Jamestown**
- Most Efficient Medium Secondary Treatment Facility, Town of **Warren** (Operated by United Water)
- Most Efficient Small Advanced Treatment Facility, Town of **Smithfield** (Operated by Veolia Water)
- Most Efficient Medium Advanced Treatment Facility, Town of **West Warwick**
- Most Efficient Large Advanced Treatment Facility, City of **Cranston** (Operated by Veolia Water)



Eddie Davies competes in the Operations Challenge Safety event

- Joseph Mattera Safety awards, **Warwick Sewer Authority** (for facilities with average daily flows of less than 5 million gallons) and city of **Cranston**, Operated by Veolia Water (for facilities with average daily flows of greater than 5 million gallons)

In addition, NWPCA recognized the following individuals for professional excellence:

- **Kathy Perez**, superintendent of the town of South Kingstown’s wastewater treatment facility (WWTF) received the James Marvelle award for leadership and contributions to NWPCA.
- **John Ayotte**, Veolia Water-Cranston WWTF, received NWPCA’s Collections System Operator of the Year.
- **Gary Ruggiero**, Narragansett Bay Commission (Field’s Point facility), received the Robert J. Markelewicz award for outstanding contributions to wastewater treatment system maintenance.
- **Douglas Nettleton**, Rhode Island Airport Corporation, received the Past President’s Plaque for his leadership from 2012 through 2014.

### NEWEA Spring Meeting

Congratulations to the Rhode Island Operations Challenge team, Ocean State Alliance, for its success in New Hampshire. The team’s effort and training paid off with several wins, such as first place in the Process Control and Lab events, and second place in the Collections, Safety, and Maintenance events. The team also took home the overall first place Operations Challenge NEWEA plaque for 2015. We are looking forward to seeing the team compete at WEF in Chicago.

In July, Mike Spring the Rhode Island state director won the Chower Contest at the NWPCA Meeting. Please visit rinwpc.info for upcoming events.



# Maine State Director Report

by Peter Goodwin  
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## MEWEA Spring Meeting April 17, 2015

The first Spring Meeting under our new name, the Maine Water Environment Association, was held on April 17, 2015, at the Hilton Garden Inn on the Androscoggin River in Auburn. The event was well attended. Technical sessions



Team Force Maine (l-r) Alex Buechner (Captain), Dan Laflamme, Ian Carter, Scot Lausier atop the safety event platform at the NEWEA Spring Meeting

included growing kelp in marine waters and its potential for nitrogen uptake and the benefits and approach to integrated water management (wastewater / stormwater / drinking water). NEWEA's and the city of Bangor's Brad Moore re-presented the NEWEA awards from the Annual Conference. As a result of "Snowmageddon 2015" and its impact on the NEWEA Annual Conference in Boston, we were able to have Mr. and Mrs. Fish (Jeff and Deb Sandler) from South Portland present two programs to more than 600 students from the Fairview Elementary School in Auburn. The presentations captivated the large

audiences, and the principal and teachers were amazed. MEWEA membership also voted on the 600 submittals for the annual Clean Water Week Poster Contest. Public Relations Committee Chair Matt Timberlake and the committee have worked extremely hard to grow this important educational event. The winners were treated to a visit with Governor Paul LePage and Department of Environmental Protection Commissioner Patricia Aho at the Blaine House in Augusta during Maine's Clean Water Week, June 1-6, 2015.

## 2015 Legislative Breakfast

The Maine Water Environment Association (MEWEA) held its Annual Legislative Breakfast at the Senator Inn in Augusta on Feb. 26, 2015. Tim Haskell from the York Sewer District again coordinated with our partner Maine Water Utilities Association (MWUA) to put together a great program for more than 10 key legislators. With critical legislation progressing on ocean acidification, gas line coordination, microbeads, and non-dispersibles, it was critical to continue this longstanding tradition. MEWEA and MWUA thank NEWEA for its support and the presence of President Matt Formica and Executive Director Mary Barry.

## NEWEA congressional briefing

President Tom Connolly, Vice President Scott Firmin, and I traveled to Washington to participate in Water Week, April 14-15 2015. This annual event is an important opportunity for all the NEWEA-affiliated state associations to convene in Washington and schedule meetings with our congressional delegations. We met with Sens. Susan Collins and Angus King and our Congressmen Chellie Pingree and Bruce Poliquin. We also attended the 2015 United States Water Prize Awards Ceremony and Reception. In addition, NEWEA GAC Chair Peter Grose and Ms. Barry attended several NACWA/WEF symposiums

and shared information from the national perspective. The NEWEA Breakfast was well attended with several New England legislators and EPA Region 1 Administrator Curt Spalding speaking.

## Urban Runoff and Green Neighbor Family Fest

The extremely active Young Professionals (YP) committee continues to grow and to engage with Maine consumers. On April 25, 2015, more than 20 members joined the MEWEA team for the Urban Runoff 5k Walk/Run and Green Neighbor Family Fest. The event raises critical funds for clean water education, which allows students learn hands-on about Maine's water environment. For the second year in a row, MEWEA gained recognition for the

largest non-profit team. Many of our YPs also set up a MEWEA booth with interactive information about what we do as water professionals, including a challenge of guessing which beaker was the effluent. Additional YP-sponsored events include a "Paddle After Hours" canoe/kayak event in August on the Androscoggin River in Lewiston and the Portland Greenfest on Saturday, Sept. 12, 2015.

## 2015 MEWEA/NHWPCA ski day

More than 60 skiers and boarders and a few telemarkers participated in the joint Ski Day at Sunday River Resort in Newry. This event continues to grow and judging by the smiling faces, a great day on the mountain was had by all.



Student Poster Contest winners pose with MEWEA officers at the capitol building in Augusta



## New Hampshire State Director Report

by Fred McNeill  
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With more than 600 licensed wastewater operators in New Hampshire, the New Hampshire Water Pollution Control Association (NHWPCA) continues to promote our industry by hosting meetings, conducting educational outreach, and providing technical support. Recent activities, association news, and hot topics are summarized below.

### Recent events

On March 25 NHWPCA hosted its most successful Legislative Breakfast to date with almost 50 legislators and about 90 interested stakeholders attending. A collaboration of 12 professional organizations that all contribute to the state's clean water efforts helped sponsor this breakfast. New Hampshire's favorite storyteller and television icon, Fritz Weatherbee, was the keynote speaker. Mr. Weatherbee's wit and words of wisdom regarding the state's water resources were enlightening and entertaining. New Hampshire's commissioner of the Department of Environmental Services (DES), Thomas Burack, closed the breakfast by sharing the state's vision, goals, and objectives for our precious water resources.

A key event that evolved from our Legislative Breakfast was a legislative site visit to the city of Manchester. Working collaboratively with our sister organization, the New Hampshire Water Works Association (NHWWA), we hosted elected officials on May 15. The officials toured the city's water treatment plant and then enjoyed a tour and cookout at the wastewater treatment plant. The tours were so successful that next year's event is already being planned in cooperation with NHWWA and will be hosted by the city of Concord.

On April 13, a four-person delegation from New Hampshire joined hundreds of other water professionals in Washington, D.C., to attend "Water Week." The trip culminated with NEWEA's Congressional Breakfast on April 15. The New Hampshire delegation included NHWPCA President Peter Goodwin, DES Water Division Director Gene Forbes, Shelagh Connelly,

president of Resource Management, Inc., and city of Manchester's Fred McNeill. The delegation met with Congresswoman Kuster, Congressman Guinta, and Senator Ayotte, and also attended two congressional receptions. New Hampshire's congressional delegation was well informed of the water industry's challenges, including the aging and failing infrastructure, increased regulatory requirements, effects of climate change, and the need to establish a source of sustainable funding for water projects. With the help of our outreach and informational efforts, New Hampshire's elected officials fully understand that Water's Worth It.

On April 16, NHWPCA hosted our annual Trade Fair at Manchester's Executive Court Club. The Trade Fair supports and involves our vendors and equipment suppliers, a critical composition of our professional team. Equipment demonstrations and technical sessions were held during the Trade Fair. At lunch, NHWPCA recognized our recent Water Environment Federation (WEF)/NEWEA award winners and the winners of our annual grade-school clean water poster contest.

On April 18, NHWPCA continued its educational outreach by participating in Discover Wild NH Day. This fun-filled educational day is sponsored by the New Hampshire Fish and Game Department. The event serves to educate residents about wildlife and recreational opportunities in New Hampshire, and it focuses on the importance of clean water for the well-being of New Hampshire's wildlife. More than 3,000 visitors attended this popular annual event.

On May 19, NHWPCA sponsored a 1-day Wipes and FOG Workshop in Concord. DES has been championing this critical issue and assisted us

in bringing this important message to water professionals during the workshop.

In June, NHWPCA was proud to assist with NEWEA's Spring Meeting at the beautiful Mt. Washington Resort. NHWPCA arranged for the keynote speaker (DES Commissioner Burack), organized an operator's session, and hosted the successful cog railway train ride to the top of Mt. Washington. We were honored to share the beauty of our fine state with our colleagues from throughout New England.

On June 26, NHWPCA held its annual summer meeting at Ellocoya State Park on beautiful Lake Winnepesaukee. There were technical sessions on sewer lining technology followed by a sensational lobster and steak tip cookout topped off with an open ice cream bar for dessert.

On Aug. 6, NHWPCA hosted its 26th annual golf tournament at the historical Beaver Meadow Golf Course in Concord. The association is proud to support the city of Concord's 119-year-old municipal course, one of only two municipal courses in New Hampshire. More than 90 golfers enjoyed a day of golf and fellowship while supporting our organization.

### Future events

On Oct. 8, NHWPCA will hold our Fall Meeting along the banks of the beautiful Connecticut River that separates New Hampshire and Vermont. The meeting will be hosted by the town of Hanover, home to Dartmouth College. Our Winter Meeting is December 10 and will be hosted by the Merrimack wastewater treatment plant (WWTP). Both meetings will provide tours of recent upgrades at the WWTPs, technical presentations, and, as always, a luxurious lunch.

In January 2016, NHWPCA will once again sponsor the Conservation New Hampshire's Green Eggs and Ham-shire Breakfast. This policy breakfast is a premier event for New Hampshire's environmental community. Top elected officials and policy makers will speak about the direct link between clean water and the state's economic well-being.

### Association name change (a.k.a. live free or die)

NHWPCA conducted a vote on a proposal to change the association's name to the New Hampshire Water Environment Association to coordinate with the regional and national branding of



Washington, D.C. Water Week NH delegation: (l to r) Liam Reihs, a junior at Plymouth HS, Fred McNeill, Peter Goodwin, Congressman Guinta, Shelagh Connelly, Gene Forbes

WEF and NEWEA. In New Hampshire's "live free or die" tradition, this name change was voted down, thus confirming New Hampshire's desire for professional independence and autonomy.

### NHWPCA turns 50

NHWPCA turns 50 years old in 2017 and the planning for our golden anniversary has already started. NHWPCA started in the town of Hampton with its first meeting, a clambake, in 1967. A committee has been formed to organize the commemoration of this historic event. We have even dug out some "skeletons" from our closets—the likes of George Neill and Ed Rushbrook—to help plan this gala event. Please stay tuned for more news as NHWPCA approaches our 50th anniversary.

### Hot topics

With metals and nutrients limits critical in National Pollutant Discharge Elimination System (NPDES) permitting, NHWPCA is emphasizing the need for clean sampling techniques. Clean water sampling has been successfully used in the state to confirm Whole Effluent Toxicity (WET) data, upon which many NPDES permits are based. Proper protocols and formalized QA/QC procedures are critical in clean sampling. As always, we want our water quality decision-making based on sound science, and clean sampling provides the proper baseline data to help regulators make informed decisions.

### A final goodbye

A colleague and friend to many NHWPCA members, long-time Allenstown WWTP employee Russell Smock passed away on July 26. We close this article with a final salute and goodbye to Russ from his friends at NEWEA and NHWPCA.



# Connecticut State Director Report

by Jay G. Sheehan  
jsheehan@woodardcurran.com



## Wastewater operators—our unsung heroes

With the recent disasters and emergency declarations, first responders have been in the news often. A simple Google search on “first responders” reveals more than one million news stories in July alone. In contrast, our American wastewater operator remains largely out of the news. A similar Google news search indicates that for the same period wastewater operators are in the news 282,000 times. (A filter for positive versus negative press was not conducted.)



Even the smallest jobs can be critical to the wastewater process. Operator, Richard Mello cleans a basket filter.

Although not surprising, the relative anonymity of the American wastewater operator is unfortunate since, as we all know, our operators, who might be referred to as “constant responders,” are as qualified, trained, and important in our communities as first responders.

To compare, first responders primarily respond to emergencies when they happen and conduct important work: They secure the area, evacuate people, address injuries, and follow up with an investigation. Wastewater operators respond

similarly to an emergency (such as an overflow): They secure the area, evacuate people, assess the potential for human health concerns, address the problem, and follow-up with an investigation, all while protecting the environment so that all life is sustainable. Operators also are proactively trained in prevention and inspection, investing most of their time in proactive prevention (by constantly responding to changing process conditions) in addition to emergency response. Our proactivity in environmental protection protects the health not only of humans but of all species. Operators also work within a highly regulated environment. Training includes collection systems, biological nutrient removal, electrical safety, OSHA, CMOM, asset management, and high-level technology, including CMMS, SCADA, handheld devices, and more.

While the uniforms and hard hats may differ, first responders and wastewater operators (our constant responders) are crucial to our communities. Both make our society more livable and improve our way of life. For whatever reason, however, our wastewater operators receive far too little credit and attention for their valuable life-enhancing services. With that in mind, please continue to promote wastewater operators at every opportunity so our unsung heroes receive the credit they deserve.

## Advancing the Connecticut wastewater agenda

Connecticut is enjoying another positive year advancing our wastewater agenda throughout the state. Highlights include:

- The Connecticut Water Pollution Abatement Association (CWPA) sponsored several successful events/activities, including the CWPA Trade Show, Sewer Open Golf Outing, CWPA Ski Classic, Manager’s Training Program, and several more events.
- The Connecticut Association of Water Pollution Control Authorities (CAWPCA)

furthered its mission with several events/activities: CAWPCA.org website launch; extremely well-attended spring and fall workshops; the addition of online legislative tracking tools; and other related activities.

- CWPA and CAWPCA successfully collaborated to ensure that the Clean Water Legislative Breakfast in Hartford and the Washington, D.C., Congressional Fly-in were a resounding success. CWPA and CAWPCA are finalizing their agendas for next year, so please reach out and communicate any items you wish to see addressed in 2016. For CWPA issues, please contact Mike Bisi (Mike.Bisi@glastonbury-ct.gov); for CAWPCA requests, please contact Tom Sgroi (tsgroi@gnhwpc.com).

## 2015–2016 Connecticut wastewater events

The 2015–2016 schedule is busy! Please mark your calendar and plan to participate in the following events:

CONNECTICUT WASTEWATER EVENTS		
Event	Date	Location
CT Operator Exchange	October 2015	10 WWTFs, CT
CAWPCA Fall Meeting	November 6, 2015	Marriott Courtyard, Cromwell, CT
CWPA / NEIWPCC Fall Manager's Forum	November 17, 2015	MDC Training Facility, Hartford, CT
NEWEA Annual Conference	January 24-27, 2016	Boston, MA
CWPA Connecticut Legislative Breakfast	March 2016	Hartford, CT
CWPA Ski Classic	March 2016	Stratton, VT
CWPA Annual Tradeshow	April 2016	New Life Church, Wallingford, CT
CAWPCA Annual Meeting	May 2016	TBD
CWPA Sewer Open	June 2016	Skunkamaug CC, Coventry, CT
CWPA Scholarship Awards	June/July 2016	TBD



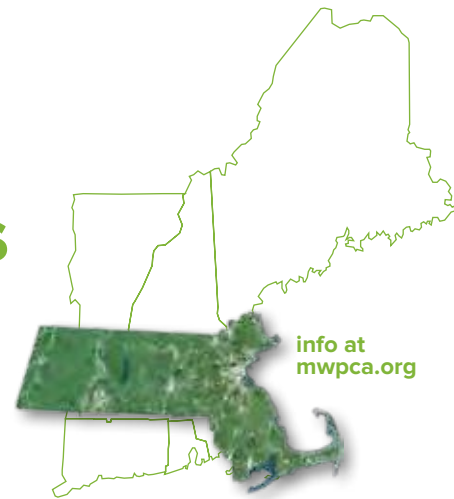
1. Brian Armet and the Braccios at the NEWEA president's reception  
2. Nutmeggers Mary Lee Santoro, Dennis Palumbo, and Gary MacDonald greet each other at the president's reception, NEWEA spring meeting





# Massachusetts State Director Report

by Mike Moreau  
mikem@wvtsinc.com



The Massachusetts Water Pollution Control Association (MWPCA), founded in 1965, is celebrating its 50th anniversary this year. From its beginnings as a group of operators meeting at various treatment facilities for support and learning, the organization now boasts some 800 members, and still keeps its main focus on support, training, and advocacy on behalf of operations and maintenance personnel throughout Massachusetts.

### Western region quarterly meeting

On June 17, MWPCA held its western region quarterly meeting at the Log Cabin in Northampton. As part of the continued celebration of our 50th anniversary, Jim Dostal, an MWPCA founder, was invited to share his thoughts and

included technical sessions such as presentations from the Massachusetts Department of Environmental Protection (MassDEP) about technical and financial resources for treatment plants and a segment on the state's water treatment resilience program. There was a final presentation on operator certification by retiring MassDEP stalwart Tom Bienkiewicz, and a lecture about energy management from United Water's Elizabeth Watson.

The June quarterly meeting is also the Annual Election Meeting for MWPCA; after the business meeting was called to order by President Mike Foisy, and following a presentation by Nominating Committee Chair Charles Tyler, a vote was taken and the following officers were elected to 3-year terms on the board of directors: Bob Greene, incumbent and current vice president; Linda Schick, past president and current education coordinator; Eric Smith; and Marcel Tremblay, incumbent and current president-elect. Thanks were offered to retiring board members Henry Albro and Vincent Melendez for past service and for the promise of their continued involvement.

At the first meeting of the board of directors following the elections, the new board was organized and officers installed for the coming year (July 2015 through June 2016): Marcel Tremblay, president; Robert Greene, president-elect; Eric Smith, vice president; Charles Tyler, recording secretary; Roger Hammond, treasurer; Linda Schick, education coordinator; and Thomas Azevedo, program coordinator.



The Mass Operations Challenge team strides purposefully toward the Safety Event platform at the NEWEA Spring Meeting. (l-r) Ashley Warren, Jason Swain, Richard Ruppert, and Michael Williams

experience from the beginnings of the MWPCA. Unfortunately, Jim could not attend the meeting, but Michael Burke, MWPCA past president, read comments prepared by Mr. Dostal to the audience in the full conference room. Nearly 100 members attended the meeting, which

### MassDEP employee retirements

A sign of the times is the continued drain on our experience and knowledge by way of retirement. The commonwealth of Massachusetts early retirement package of 2015 resulted in the departure of numerous MassDEP employees who have been great friends and helpers to MWPCA. We will greatly miss their talents and expertise even as we look forward to working with a leaner, newly organized MassDEP to produce what we hope will be an equally productive result.

### Recent and future events

MWPCA hosted another successful golf tournament at Shaker Hills golf course on June 22. The weather was fabulous, and the golf was stimulating.

The Operator Exchange occurs this year between Massachusetts and New Hampshire. MWPCA looks forward to entertaining the New Hampshire operator with several plant tours on September 21 and 22, culminating in our MWPCA 50th Anniversary Trade Show on September 23 at the Wachusett Mountain Resort. The Massachusetts exchange operator will travel to New Hampshire and receive tours of treatment facilities on October 7 followed by dinner with the New Hampshire Water Pollution Control Association (NHWPCA) board of directors, and will then attend the October 8 NHWPCA fall meeting in Hanover.

On May 28, a dedication ceremony and training session was held at the Richard Alden training facility in Millbury. The training room at the facility was dedicated and named in the memory of Michael Ackerman, long-time MWPCA advocate and past president, who spent countless hours training and encouraging wastewater treatment plant operators in the room that now bears his name. More than 60 of Mr. Ackerman's students, friends, and family attended the event, which included presentations by John Downey, Tim Hutchins, Tom Valorose, and Tom Bienkiewicz.

### MWPCA training

MWPCA training continues with the offering of a 3-day course covering National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP), Manhole Assessment and Certification Program (MACP) and Lateral Assessment and Certification Program (LACP). The course will be offered on October 1, 2 and 5, 2015, in the Michael Ackerman training room at the Richard Alden training facility.

### MPWCA Spring Meeting, Holyoke, Mass.



1. Registration desk 2. Program coordinator Tom Azevedo 3. Elizabeth Watson shares her energy management expertise 4. MassDEP's Michael DeBara discusses technical and financial assistance 5. Kristin Divris of MassDEP outlines water utility resilience 6. A packed house at the Log Cabin 7. Ashley Warren and Susan Guswa 8. Tom Bienkiewicz, who spoke about operator certification and training, is now retired from MassDEP



# 2015 Spring Meeting & Exhibit PROCEEDINGS



1. 2015 inductees to the Select Society of Sanitary Sludge Shovelers - Tom Groves, Lenny Young, Ray Willis, Janine Burke, Susan Sullivan, Priscilla Bloomfield, and Frank Occhipinti - pose with Influent Integrator Charles Tyler 2. Renee Bourdeau 3. Phil Forzley converses with the Formica family at the President's reception 4. Watershed Management committee chair Phil Forzley reports at the Executive committee meeting as Peter Grose and Mike Spring listen 5. Attendees relax at the Monday evening reception

The New England Water Environment Association held its Annual Spring Meeting on June 7–10, 2015, at the Omni Mount Washington Resort in Bretton Woods, New Hampshire. Meeting registrants totaled 200. Registrants included 144 members, 22 non-members, 19 Operations Challenge participants, and 15 guests. The meeting also featured 19 exhibit booths.

A full NEWEA Executive Committee meeting with Committee Chairs was held on Sunday, June 7, 2015, with NEWEA President Matt Formica presiding.

In addition to the Opening Session, there were eight technical sessions and one tour.

### BREAKFAST & GENERAL OPENING SESSION

**Moderator:**  
• Jessica Cajigas, NEWEA Program Committee Chair, Comprehensive Environmental, Inc.

**Welcome:**  
• Matt Formica, NEWEA President, AECOM

**Featured Speaker:**  
• Tom Burack, Commissioner of the NH Department of Environmental Services

**Washington Fly-in Update:**  
• Peter Grose, Chair of Government Affairs Committee

### SESSION 1 OPERATOR FORUM—A NEW HAMPSHIRE PERSPECTIVE

**Moderators:**  
• Peter Goodwin, President NHPWA  
• Tim Vadney, Wright-Pierce

**Panelists:**  
• Ray Vermette, City of Dover, NH  
• Donna Hanscom, City of Keene, NH  
• David P. Bernier, North Conway, NH Water Precinct  
• Fred McNeill, City of Manchester, NH

### SESSION 2 STORMWATER—PRE-DESIGN PLANNING, MODELING AND ASSESSMENT

**Moderators:**  
• Patricia Chesebrough, Weston & Sampson  
• Scott Firmin, Portland Water District

CMOM in the Rain—How Portland Is Applying CMOM to Drainage System Assets

• Barry Sheff, Woodard & Curran  
• Megan McDevitt, Woodard & Curran  
• Nancy Gallinaro, City of Portland, ME

Fine Sediment Treatment Pilot Test on Stormwater

• Russell Parkman, GZA GeoEnvironmental, Inc.

Groundwater Models Gone Green: Using 2D Models to Improve Green Stormwater Infrastructure Design

• Laurie Kellendorfer, CDM Smith  
• Matthew Gamache, CDM Smith  
• Jason Cruz, Philadelphia Water Department

Financial Capability Assessment in the New EPA Framework

• David VanHoven, MWH; Greg Baird, MWH

### SESSION 3 SUSTAINABILITY—NEW ENGLAND SUCCESS STORIES

**Moderators:**  
• Scott Lander, Retain-It  
• Jessica Cajigas, Comprehensive Environmental Inc.

Energy Efficiency to Energy Sustainability to Net Zero Energy User  
• Richard Weare, GLSD

Blower Replacement Reduces Shelton WPCF Electric Bill by Over 20%

• Matthew Jermine, Fuss & O'Neill;  
• Garritt Ogden, City of Shelton, CT

Energy Savings at the City of Montpelier Water Resource Recovery Facility

• Robert Fischer, City of Montpelier, VT WRRF

“A Gallon Saved is a Penny Earned”—A Case Study in Savings and Sustainability by Water Recycling and Reuse at an Industrial Facility

• Ronald Burns, CHA Consulting  
• Michael Gliński, Twin Rivers Technologies  
• Douglas Urquhart, CHA Consulting

### SESSION 4 INSIGHTS INTO MEETING WATER QUALITY STANDARDS

**Moderators:**  
• Lauren Hertel, Stantec  
• Thomas Loto, Kleinfelder

The Significance of Reporting Methodologies in Stringent Phosphorus NPDES Permits

• Elena Proakis Ellis, CDM Smith

New Ultra-low Metals and Nutrient NPDES Permit Limits

• Douglas Corb, U.S. EPA Region 1

CT MS4 Regulations—Proposed Changes and Community Impacts

• Lori Carriero, Tighe & Bond

Redefining the Clean Water Act on Cape Cod

• Erin Perry, Kristy Senatori, Paul Niedzwiecki, and Philip “Jay” Detjens, Cape Cod Commission

### SESSION 5 MODERNIZING COLLECTION AND TREATMENT SYSTEMS

**Moderators:**  
• Susan Guswa, Tighe and Bond  
• Peter Goodwin, Consultant

2014—A CMOM Odyssey—Modernizing New Bedford's CMOM and Asset Management Programs

• Shawn Syde, CDM Smith  
• Ronald Labelle, City of New Bedford, MA  
• James Ricci, City of New Bedford, MA  
• Zeb Arruda, City of New Bedford, MA

Clarifiers—Making What We Have Work Better!

• John Esler, Clarifier Performance Evaluations, Inc.

Minor Changes Resulting in Major Improvements to the Sewer System

• Vinta Varghese, CH2M  
• Dingfang Liu, CH2M;  
• Bruce Kirkland, Greater New Haven WPCA

A Model for the Future—The Mattabassett District WPCF Upgrade

• William Hankins, Wright-Pierce;  
• Brian Armet, The Mattabassett District



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1. President's Breakfast gathering - President Matt Formica, center, surrounded by (l-r) Past presidents Charles Tyler, Mike Bonomo, Alfred Schiff, Howard Carter, Russell Adams, and Douglas Miller. 2. Patty Chesebrough and Lenny Young share a smile 3. Walter Palm, Dennis Palumbo, and Jerry Potamis pose at the Monday evening reception

1. Jeanne Walker discusses Nashua's CS challenge 2. Mark French makes a point during his presentation 3. Vinta Varghese shares her collection system expertise 4. The Spring Meeting technical sessions were popular and informative

**SESSION 6  
STORMWATER—DESIGNS FOR  
WATERSHED PROTECTION**

**Moderators:**

- Charles Wilson, Hazen and Sawyer
- Ed Rushbrook, Process Analysts

**Integrated Planning in the Exeter/  
Squamscott Watershed: New Flexibility  
Brings New Opportunities**

- Renee Bourdeau, Geosyntec;
- Robert Roseen, Geosyntec Consultants;
- Alison Watts, University of New Hampshire
- Paul Stacey, GBNERRS

**BMP Site Suitability in Boston**

- Chelsea Durante, CH2M

**Crosby Brook (Putney Road) Restoration  
Study Project**

- Ben Lundsted, Comprehensive Environmental Inc.

**Protect the Pond! Restoring an Urban  
Watershed using Green Infrastructure  
and Public Outreach**

- Jennifer Johnson and Scott Turner, Nitsch Engineering

**SESSION 7  
PREPARING FOR THE FUTURE IN  
TREATMENT OPERATIONS**

**Moderators:**

- Joseph Kietner, City of Chicopee, MA
- John Jackman, Hoyle, Tanner & Associates

**Your Sampling Practices May Be Costing  
Your Facility Millions!**

- Ricardo Cantu, City of Manchester, NH

**Research, Regulations, Product Quality, &  
the Media—Biosolids in 2015**

- Deborah Mahoney, Hazen and Sawyer;
- Ned Beecher, NEBRA

**Pilot-Testing Coupled with Computer  
Modeling Produces Improved Land-  
Application Design for the MFN Regional  
Wastewater District**

- Robert Schreiber, CDM Smith
- Frances Bui, CDM Smith
- Buvana Ramaswamy, CDM Smith
- David Young, CDM Smith

**Wastewater Infrastructure Climate  
Change Adaptation—What wastewater**

managers need to know to respond to flooding, sea level rise and storm surge

- John Braccio, Wright-Pierce
- Jonathan Edgerton, Wright-Pierce
- Paul Birkel, Wright-Pierce
- Ryan Wingard, Wright-Pierce

**SESSION 8  
CSO REDUCTIONS—LONG-TERM  
CONTROLS**

**Moderators:**

- James Riordan, ESS Group
- Ken Carlson, Woodard and Curran

**City of Seattle, Seattle Public Utilities  
Integrated Plan**

- Eric Strecker, Geosyntec

**Mini-Basin Metering to Quickly Isolate  
Sources of RDII in Bear Brook**

- Howard Carter, City of Saco, ME;
- Michael Armes, ADS Environmental Services
- Patrick Stevens, ADS Environmental Services

**A Unique Gravity-in/Gravity-out Facility  
Provides Effective CSO Treatment**

- Frank Ayotte, Hazen and Sawyer

- Charles Wilson, Hazen and Sawyer;
- Amy Prouty-Gill, City of Nashua, NH
- Jeanne Walker, City of Nashua, NH

**A Customized Approach to Sewer  
System Rehabilitation Program—Lateral  
Lining in Westwood, MA**

- Marina Fernandes, CDM Smith
- Jeffrey Bina, Town of Westwood, MA
- Todd Korchin, Town of Westwood, MA
- Richard Barry, Town of Westwood, MA

**Optimizing CSO Reduction Through The  
Shuffled Frog Leaping Algorithm**

- Greg Brenner, CH2M;
- Dingfang Liu, CH2M
- Andrew Erikson, CH2M
- Vinta Varghese, CH2M

**Acoustics for Wastewater—What You  
Can Learn in 3 Minutes Will Save You  
Thousands in SSO's!**

- Mark French, Wachs Water Services

**TOUR**

The World's First Mountain Climbing Train, the only Cog Railway East of the Rockies, to the Top of Mount Washington

- Coordinator: Peter Goodwin

**OPERATIONS CHALLENGE**

Operations Challenge Committee:  
Michael Burke, Chair;  
Travis Peaslee, Vice Chair

Operations Challenge was held on Tuesday, June 9, 2015. Four teams participated in the competition:

**Maine – Force Maine:**

Alex Buechner (Captain), Ian Carter, Dan Laflamme, Scot Lausier

**Massachusetts – Resource Revolution:**

Mickey Nowak (Coach), Richard Ruppert, Jason Swain, Ashley Warren (Captain), Michael Williams

**New Hampshire – Seacoast Sewer  
Snakes:**

Paula Anania (Coach), Mike Baker (Captain), Mike Carle, Tim Deguglielmo, Patty Chesebrough

**Rhode Island – Ocean State Alliance:**

Eddie Davies (Captain), Ryan Cherette, Joe Crosby (Coach), Ryan Patnode, Vinnie Russo

The Operations Challenge Awards Reception was on Tuesday, June 9, 2014 at 4:00 PM. Committee Chair Mike Burke and each event coordinator, assisted by NEWEA President Matt Formica, presented trophies to the winning teams of each event and to the overall first-, second-, and third-place winning teams. The results of the competition are reported as follows:

**First Place Individual Events:**

- Process Control—Rhode Island
- Safety—New Hampshire
- Collection Systems—New Hampshire
- Laboratory—Rhode Island
- Pump Maintenance—Maine

**Overall Competition:**

- Third Place—Maine
- Second Place—New Hampshire
- First Place—Rhode Island

During the reception, it was announced that NEWEA would support the first-, second-, and third-place teams in the 2015 WEF National Operations Challenge competition to be held in Chicago, Illinois in September.



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1. Spouses' Program participants pose in their Kentucky Derby-inspired outfits prior to indulging in their high tea 2. Fred McNeill arrived prepared for golf in the morning rain, but the rain stopped just before the shotgun start 3. Donna Hanscom and John Jackman were on hand to see Jenn Lachmayr off on her solo Tuesday morning bike ride 4. Lab event judges conferring in their colorful lab coats (l-r) Margie Bower, Nora Lough, Walter Palm, MaryLee Santoro, and Jim Galasyn

1. The victorious Rhode Island Operations Challenge team (l-r) Ryan Patnode, Joe Crosby (coach), Eddie Davies (Captain), Vinnie Russo, and Ryan Cherette 2. Team Force Maine displaying their hardware; (l-r) Scot Lausier, Alex Buechner (Captain), Ian Carter, Dan Laflamme 3. Mike Carle attends the spray bottle while Patty Chesebrough displays her pipetting style in the lab event 4. The New Hampshire team showing off their trophies; (l-r) Paula Anania, Mike Carle, Mike Baker (Captain), Tim Deguglielmo, Patty Chesebrough

**Event and Equipment Coordinators:**

- Process Control—Paul Dombrowski, Michael Harris
- Safety—James Laliberte
- Collection Systems—EJP, Lenox Tools, Michael Smith
- Laboratory—YSI, MaryLee Santoro
- Pump Maintenance—Xylem-USA, Brian Farmer

**Scorekeeping:**

- Overall—Jane Brooks, Travis Peaslee

**Judges:**

- Process Control—Operations Challenge Committee
- Safety—James Laliberte, Scott Goodinson, Travis Peaslee
- Collection Systems—Mike Smith, Laurie Perkins, Tim Vivian, Mike Armes
- Laboratory—MaryLee Santoro, Margie Bower, Nora Lough, Walter Palm, Jim Galasyn.
- Pump Maintenance—Brian Farmer, Dennis Palumbo, John Lord

**Miscellaneous:**

- Trophies—Joseph Kruzel, Michael Burke
- Shirts—Daniel Marks

**SELECT SOCIETY OF SANITARY SLUDGE SHOVELERS**

During the Monday evening reception, Inluent Integrator Charles Tyler inducted eight new members into the Select Society of Sanitary Sludge Shovelers:

- Priscilla Bloomfield
- Janine Burke
- Helen Gordon
- Thomas Groves
- Frank Occhipinti
- Susan Sullivan
- Raymond Willis
- Leonard Young

**MISCELLANEOUS**

A variety of committee meetings were held throughout the Spring Meeting. The Tuesday evening reception and dinner as well as the Annual Spring Meeting Golf Tournament was held at the Mount Washington Resort. Attending spouses and guests enjoyed a number of recreational and social activities during the meeting.

**MEETING PLANNERS**

- Conference Arrangements—Ron Tiberi
- Program—Jessica Cajigas
- Registration—Kate Biedron
- Operations Challenge—Michael Burke
- Guest Program—Joy Lord
- Golf Tournament—Peter Kibble

**MEETING MANAGEMENT**

- Director—Meg Tabacsko
- Sponsors—Glenn Haas

**EXHIBITORS**

- ADS Environmental
- Brierley Associates
- Burt Process Equipment
- Casella Organics
- CUES
- Duke's Root Control
- Dynamic
- EST Associates
- F.W. WEBB Co. (Process Controls Division)
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- The MAHER Corporation
- Mechanical Solutions
- MicroC
- Resource Management
- Retain-It
- Ted Berry Company
- United Water
- Water Analytics

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- CH2M
- David F. Sullivan & Associates
- Dewberry
- Duke's Root Control
- Environmental Partners Group
- EST Associates
- Fay, Spofford & Thorndike
- Flow Assessment Services
- Fuss & O'Neill
- Green Mountain Pipeline Services
- Hayes Pump
- Hazen and Sawyer

- Kleinfelder
- Land Tech Consultants
- The MAHER Corporation
- MWH
- NEFCO
- Synagro Northeast
- Tighe & Bond
- Underwood Engineers
- United Water
- Weston & Sampson
- Woodard & Curran
- Wright-Pierce



# It's prime time.

MARK YOUR CALENDAR

## NEWEA 2016 Annual Conference & Exhibit

January 24 – 27, 2016  
Boston Marriott Hotel Copley Place  
Boston, Massachusetts



### FEATURED SPEAKER

George Hawkins is chief executive officer and general manager of the District of Columbia Water and Sewer Authority (DC Water). DC Water provides drinking water delivery and wastewater collection and treatment for the District

of Columbia, and treats wastewater for millions in several Maryland and Virginia suburbs. The Authority operates the world's largest advanced wastewater treatment plant at Blue Plains.

Since its formation in 1928, NEWEA has been holding annual meetings to provide a forum for knowledge and technology exchange within the wastewater field. Since then, the NEWEA Annual Conference has not only grown in the size of exhibits and technical sessions, but has become New England's premier water quality conference.

This prestigious conference, which consistently attracts over 2,500 engineers, consultants, scientists, operators and students features a variety of technical sessions and over 200 exhibitor displays. The conference provides an opportunity for professional exchange of information and state-of-the-art concepts in wastewater treatment and other water environment issues. The NEWEA Annual Conference is a great forum to meet colleagues, professional allies, make new friends and exchange information.

Register Online at [NEWEA.org](http://NEWEA.org)

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# 27th annual committee member appreciation event

by Dan Roop, Tighe & Bond

Third time's a charm! What a night we shared on July 16 at this year's Committee Member Appreciation (CMAC) event. The weather was perfect, the grills were sizzling, and ice cream sundaes piled high while laughs and cheers filled the air at Kimball Farm in Westford, Mass., for the 27th annual NEWEA-sponsored event. Yet, again, we had a wonderful turnout of more than 100 NEWEA committee members, family and friends, including many first-time CMAC event goers.

Throughout the year, NEWEA committee members work hard for our organization and each other, and to preserve, protect, and manage New England's water environment. The Committee Member Appreciation committee serves to recognize this wonderful work and volunteerism, and to celebrate these efforts together. Whether you attended the event or not, know that your hard work as a committee member is greatly appreciated!

The young and young-at-heart let loose and enjoyed activities such as bumper boats, mini-golf, batting cages, driving range, pitch & putt golf, and volleyball. We had our own private NEWEA party tent where folks could kick

back and enjoy good company, drinks, and an all-you-can-eat Great American BBQ. Another highlight that left many licking their lips grinning from ear to ear was the make-your-own ice-cream sundae bar, featuring Kimball's own homemade ice-cream.

There was a lot of positive post-event feedback. President-elect Jim Barsanti shared these kind words with us after the event: "It was another very successful event at Kimball Farm. We [NEWEA] really have found a home at Kimball for this event. It gets better every year."

While gathered under the NEWEA tent President Matt Formica and Committee Member Appreciation Committee Chair Dan Roop welcomed and thanked guests for attending and for all they do throughout the year. In addition to organizing the appreciation event, the CMAC also runs the Thanks-A-NEWEA program, initiated to thank committee members for their outstanding performance and lasting contributions. All committee members were invited to nominate any other member who had made a special contribution to a committee. Once again, Denise Moberg did a fabulous job spearheading the Thanks-A-NEWEA program. This year there were 19 Thanks-A-NEWEA

recipients. Each nominee received a certificate of recognition, and 10 lucky nominees received a \$75 American Express gift card. Congratulations to this year's recipients:

- Patty Passariello, Safety, Operations Challenge, Honorary Program Committee
- Michael Burke, Operations Challenge Committee
- Jim Galasyn, Lab Practices Committee
- Walter Palm, Lab Practices Committee
- Nora Lough, Lab Practices Committee
- Carina Hart, Public Education Committee
- Meg Tabacsko, Public Education Committee
- Jessica Cajigas, Program Committee
- Tim Vadney, Program Committee
- Adam Yanulis, Government Affairs Committee
- Jim Barsanti, Honorary Program Committee
- Helen Gordon, Honorary Program Committee
- Scott Firmin, Honorary Program Committee
- George Pendleton, Honorary Program Committee
- Kate Goyette, Honorary Program Committee
- Linda Austin, Honorary Program Committee
- Anastasia Rudenko, Water for People Committee
- Brian Armet, Utility Management Committee

• Kevin Olson, Collection Systems Committee  
For more information about why each member earned a nomination or to learn more about the Thanks-A-NEWEA program, please visit the NEWEA website and check out the Thanks-A-NEWEA page.

If you are a NEWEA member and would like to become a committee member, there is no time like the present. CMAC is always looking for fun, energetic new members. Are you a young new NEWEA member? Consider reaching out to Justin Skelly, chair of the YP committee. No matter which committee you join, you are sure to meet and work with great people while making a difference for NEWEA, the industry, and your own professional development.

The success of this year's event could not have been possible without the hard work and planning of many. A special thanks to Denise Moberg, Melissa Recos, Linda Austin, Mary Barry, Janice Moran, Frank Occhipinti, and the many others who helped make the event a success. More important, however, a special thanks to all the committee members who came out to enjoy a well-deserved evening of summer fun with us. We look forward to seeing you at next year's annual CMAC event!

1. Scott Lander (Collection Systems committee), Brian Pena (CSO/Wet Weather Issues committee), President Matt Formica, and Kate Biedron (Registration committee) 2. Vice President Jim Barsanti with Kerry Reed 3. Adam Yanulis (Gov't Affairs committee), CMA committee chair Dan Roop, and Charlie Tripp 4. Elie Saroufim (Website committee) 5. Jack Ellis checks to see if the camera is gone 6. Dan Roop with his brother Ben and dad Bill 7. Patty Chesebrough (Safety and Ops Challenge committees) indulges in a sundae 8. Treasurer Frank Occhipinti surrenders 9. Nelson Thibault (Government Affairs committee) and his wife catch up with Susan Landon (Journal committee) 10. A future committee member 11. Matt Formica and Mary White (Water For People committee) mix it up



## Upcoming meetings & events

### WEFTEC ANNUAL CONFERENCE

September 26 – 30, 2015

McCormick Convention Center, Chicago, IL

### NEWEA ANNUAL WEFTEC RECEPTION

September 27, 2015

Soldier Field, Chicago, IL

### NORTH EAST RESIDUALS BIOSOLIDS SYMPOSIUM & BIOCYCLE'S REFOR15

October 19 – 22, 2015

DoubleTree Hotel, Danvers, MA

### CSO/WET WEATHER ISSUES CONFERENCE & EXHIBIT

October 26 – 27, 2015

UMASS Lowell Conference Center, Lowell, MA

### EXECUTIVE COMMITTEE MEETING WITH SELECT CHAIRS

November 3, 2015

### NEWEA Office, Woburn, MA SMALL COMMUNITY SPECIALTY CONFERENCE

November 18, 2015

Publick House Sturbridge, MA

### EXECUTIVE COMMITTEE MEETING WITH ALL CHAIRS

January 24, 2016

Boston Marriott Copley Place Hotel, Boston, MA

### NEWEA ANNUAL CONFERENCE & EXHIBIT

January 24 – 27, 2016

Boston Marriott Copley Place Hotel, Boston, MA

### AFFILIATED STATE ASSOCIATIONS

#### GMWEA FALL TRADE SHOW

November 5, 2015

Sheraton Hotel & Conference Center, Burlington, VT

#### CWPAA FALL MEETING

November 6, 2015

Marriott Courtyard, Cromwell, CT

#### MWPCA QUARTERLY MEETING

December 1, 2015

Mansfield Holiday Inn, Mansfield, MA

#### NARRAGANSETT WPCA ANNUAL HOLIDAY PARTY & FOOD DRIVE & ELECTION OF OFFICERS

December 8, 2015

TBD

#### NEWWA HOLIDAY MEETING

December, 17, 2015

Lantana's, Randolph, MA

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## The NEWEA/NEBRA Northeast Residuals and Biosolids Symposium

Is now part of BioCycle REFOR15

Symposium Oct. 19 (and more Oct. 20 – 22)

Doubletree Boston North Shore—Danvers, MA

NEBRA's Membership Meeting will be held on October 19, before the Symposium

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## CSO/WET WEATHER ISSUES CONFERENCE & EXHIBIT October 26 – 27, 2015

This one-day specialty conference will benefit collection systems operators, managers, engineers, and members of the regulatory community

## SMALL COMMUNITY SPECIALTY CONFERENCE November 18, 2015

This conference will provide an overview of regulatory issues facing small to mid-sized communities, and issues related to nitrogen removal

This is a partial list. Please visit the state association websites and NEWEA.org for complete and current listings.

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# New members

## May 2015 – July 2015

Patrick Antle  
Medford, MA (YP)

Thomas Arnone  
Town of Windsor Locks WPCA  
Windsor Locks, CT (PWO)

Nicholas Bartek  
Wallingford, CT (STU)

Allison Bergquist  
Austin, TX (STU)

Dustin Briere  
Woodard & Curran  
Dedham, MA (YP)

Ryan M. Cherette  
Narragansett Bay Commission  
Providence, RI (PWO)

Maggie Clout  
Siemens  
Minnetonka, MN (PRO)

Richard Cruanes  
Wright-Pierce  
Middletown, CT (PRO)

Anthony Dilorio  
Narragansett Bay Commission  
Providence, RI (PWO)

Ben Ducharme  
Southampton, MA (STU)

Zachary Eichenwald  
Boston, MA (YP)

Mark Girgenti  
Burt Process Equipment  
Hamden, CT (PRO)

Sam Knowlton  
Rockport, MA (STU)

Yueyun Li  
Boston, MA (STU)

Nathan Loomis  
Arcadis  
Wakefield, MA (YP)

Anjuliee Mittelman  
Somerville, MA (STU)

Phillip James Nelson  
Monroe, CT (PRO)

Peter Sellers  
Town of Framingham  
Framingham, MA (COMP)

Nathan Boiros  
Narragansett Bay Commission  
Providence, RI (PWO)

Vanessa Borkowski  
Hartford, CT (YP)

Lance Delpriore  
Weston & Sampson Engineers Inc.  
Peabody, MA (YP)

Viktor Hlas  
Optirtc Inc.  
Boston, MA (YP)

William G. Hoffman  
Chatham, MA (PRO)

Manu Kapoor  
Boston, MA (PRO)

Alice Lara  
Danbury, CT (PRO)

Jeffrey Lewis  
East Hartford, CT (STU)

Christian Lund  
Town of Groton  
Groton, CT (PRO)

Paul Peter Mathisen  
Worcester Polytechnic Inst.  
Worcester, MA (PRO)

Tamara Pinard  
Windham, ME (PRO)

Rachel Smith  
Windham, ME (YP)

Lindsay Wood  
Canton, MA (YP)

Sophie Bardos  
Riverside, CT (STU)

Kirk Brown  
Ware, MA (PRO)

Julia Ennis  
Fairfield, CT (STU)

Grace Herrick  
Sandy Hook, CT (COMP)

Baekjoon Kang  
Suffield, CT (COMP)

Gemma Kite  
Horsley & Witten Inc.  
Sandwich, MA (YP)

Nick Knudsen  
South Burlington, VT  
(COMP)

Carmen Krzesik  
Southington, CT (PWO)

James Lavalley  
City of Nashua WTF  
Nashua, NH (PWO)

Ethan Novek  
Greenwich, CT (STU)

Ryan Patnode  
Coventry, RI (PWO)

Matthew Rogers  
Suffield, CT (COMP)

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Affiliate (AFF)

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Corporate (COR)

Dual (DUAL)  
Executive (EXEC)

Honorary (HON)  
Life (LIFE)

Professional (PRO)  
Professional WW/OPS (PWO)

Student (STU)  
Young Professional (YP)

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# New England Water Environment Association, Inc.

## Statement of activities

For the years ended September 30, 2014 and 2013

Changes in unrestricted net assets:	2014	2013
Revenues and gains:		
Registration Fees	\$477,366	\$374,707
Exhibitor Fees	259,350	389,332
Membership Dues	56,083	64,222
Pass Through Dues	29,912	9,561
Advertising and Subscriptions	87,070	10,800
Sponsorships	65,129	56,055
Certification Fees	16,100	8,495
NEBRA Management revenue	8,803	46,014
Other Income	33,393	37,182
<b>Total unrestricted revenues and gains</b>	<b>1,033,206</b>	<b>996,368</b>
<b>Total unrestricted revenues and gains and other support</b>	<b>1,033,206</b>	<b>996,368</b>
Expenses:		
Program services	867,279	710,521
Management and general	332,570	201,913
Pass Through Dues	13,413	9,740
NEBRA Management expense	12,310	48,795
<b>Total expenses</b>	<b>1,225,572</b>	<b>970,969</b>
(Decrease) Increase in unrestricted net assets	(192,366)	25,399
Changes in temporarily restricted net assets:		
Endowment income	12,163	(2,703)
Scholarship expense	9,000	9,000
Increase (decrease) in temporarily restricted net assets	3,163	(11,703)
<b>(Decrease) increase in net assets</b>	<b>(189,203)</b>	<b>13,696</b>
<b>Net assets, beginning of year</b>	<b>861,840</b>	<b>848,144</b>
<b>Net assets, end of year</b>	<b>\$672,637</b>	<b>\$861,840</b>

# Thank you

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United Water  
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### Bronze

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- NEWEA Annual Conference
- NEWEA Spring Meeting & Golf Tournament
- The Operations Challenge Golf Tournament
- A web presence on NEWEA.org's sponsorship program page
- The option to customize sponsorship levels by selecting to participate in up to eight additional unique NEWEA events plus additional activities

### Sponsorship Benefits:

- Increased corporate visibility and marketing opportunities within a wide audience of water industry professionals
- Relationship-building access to key influencers involved in advancing water industry services, technology, and policy
- Recognition as an environmental leader among peers and customers

For more information contact Mary Barry:  
EMAIL: [mbarry@newea.org](mailto:mbarry@newea.org)  
CALL: 781-939-0908



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CALL: 781-939-0908



## NEWEA/WEF\*\* Membership Application 2015



### Personal Information

Last name \_\_\_\_\_ M.I. \_\_\_\_\_ First Name \_\_\_\_\_ (jr. sr. etc) \_\_\_\_\_

Business Name (if applicable) \_\_\_\_\_

Street or P.O. Box \_\_\_\_\_ (  Business Address  Home Address )

City, State, Zip, Country \_\_\_\_\_

Home Phone Number \_\_\_\_\_ Business Phone Number \_\_\_\_\_ Fax number \_\_\_\_\_

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Please send me information on special offers, discounts, training, and educational events, and new product information to enhance my career  by e-mail  by fax

Check here if renewing, please provide current member I.D. \_\_\_\_\_

**\*\*NEWEA is a member association of WEF (Water Environment Federation). By joining NEWEA, you also become a member of WEF.**

### Employment Information (see back page for codes)

1. ORG Code: \_\_\_\_\_ Other (please specify): \_\_\_\_\_ 2. JOB Code: \_\_\_\_\_ Other (please specify): \_\_\_\_\_

3. Focus Area Codes: \_\_\_\_\_ Other (please specify): \_\_\_\_\_

Signature (required for all new memberships) \_\_\_\_\_ Date \_\_\_\_\_

### Sponsorship Information

WEF Sponsor name (optional) \_\_\_\_\_ Sponsor I.D. Number \_\_\_\_\_ ACQ. Code for WEF use only | WEF 15 \_\_\_\_\_

### Membership Categories (select one only)

Membership Category	Description	Member Benefit Subscription	Dues
<input type="checkbox"/> Professional Package	Individuals involved in or interested in water quality	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> WEF Highlights Online	\$157
<input type="checkbox"/> Young Professional Package	New members or formerly student members with 5 or less years of experience in the industry and less than 35 years of age. This package is available for 3 years.	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> WEF Highlights Online	\$67
<input type="checkbox"/> Professional Wastewater Operations (PWO) Package	Individuals in the day-to-day operation of wastewater collection, treatment or laboratory facility, or for facilities with a daily flow of < 1 mgd or 40 L/sec.	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> WEF Highlights Online	\$96
<input type="checkbox"/> Academic Package	Instructors/Professors interested in subjects related to water quality.	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> WEF Highlights Online <input type="checkbox"/> Water Environment Research (Online)	\$157
<input type="checkbox"/> Student Package	Students enrolled for a minimum of six credit hours in an accredited college or university. Must provide written documentation on school letterhead verifying status, signed by an advisor or faculty member.	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> WEF Highlights Online	\$10
<input type="checkbox"/> Executive Package	Upper level managers interested in an expanded suite of WEF products/services.	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> World Water <input type="checkbox"/> Water Environment Research (Online) <input type="checkbox"/> Water Environment Regulation Watch	\$338
<input type="checkbox"/> Dual	If you are already a member of WEF and wish to join NEWEA		\$40
<input type="checkbox"/> Corporate Membership (member benefits for one person)	Companies engaged in the design, construction, operation or management of water quality systems. Designate one membership contact.	<input type="checkbox"/> WE&T (including Operations Forum) <input type="checkbox"/> Water Environment Research (Print) <input type="checkbox"/> Water Environment Regulation Watch <input type="checkbox"/> WEF Highlights Online	\$393

**WEF Utility Partnership Program (UPP):** NEWEA participates in the WEF Utility Partnership Program (UPP) that supports utilities to join WEF and NEWEA while creating a comprehensive membership package for designated employees. As a UPP Utilities can consolidate all members within their organization onto one account and have the flexibility to tailor the appropriate value packages based on the designated employees' needs. Contact WEF for questions & enrollment (703-684-2400 x7213).

### Payment

<input type="checkbox"/> Check or money order enclosed Made payable to NEWEA 10 Tower Office Park, Suite 601 Woburn, MA 01801 For more information: 781.939.0908 Fax 781.939.0907 NEWEA.org	<b>Charge</b> <input type="checkbox"/> Visa <input type="checkbox"/> American Express <input type="checkbox"/> Master Card <input type="checkbox"/> Discover	Card # _____	Security/CVC _____	Exp. Date _____	<i>Depending upon your membership level, \$10 of your dues is allocated towards a subscription to the NEWEA Journal.</i>
		Daytime Phone _____			
		Signature _____			
<b>Billing Address</b> ( <input type="checkbox"/> check here if same as above )		Street/PO Box _____	City, State, Zip _____		

# NEWEA/WEF\*\* Membership Codes 2015



To help us serve you better, please complete the following:

(choose the one that most closely describes your organization and job function)

\*\*NEWEA is a member association of WEF (Water Environment Federation). By joining NEWEA, you also become a member of WEF.

## What is the nature of your ORGANIZATION?

(circle one only) (ORG)

- 1**  
Municipal/district Water and Wastewater Plants and/or Systems
- 2**  
Municipal/district Wastewater Only Systems and/or Plants
- 3**  
Municipal/district Water Only Systems and/or Plants
- 4**  
Industrial Systems/Plants (Manufacturing, Processing, Extraction)
- 5**  
Consulting or Contracting Firm (e.g., Engineering, Contracting Environmental, Landscape Architecture)
- 6**  
Government Agency (e.g., U.S. EPA, State Agency, etc.)
- 7**  
Research or Analytical Laboratories
- 8**  
Educational Institution (Colleges and Universities, libraries, and other related organizations)
- 9**  
Manufacturer of Water/Wastewater Equipment or Products
- 10**  
Water/Wastewater Product Distributor or Manufacturer's Rep.
- 11**  
Stormwater (MS4) Program Only
- 12**  
Other \_\_\_\_\_ (please specify)

## What is your Primary JOB FUNCTION?

(circle one only) (JOB)

- 1**  
1. Upper or Senior Management (e.g., President, Vice President, Owner, Director, Executive Director, General Manager, etc.)
- 2**  
Engineering, Laboratory and Operations Management (e.g., Superintendent, Manager, Section Head, Department Head, Chief Engineer, Division Head, Landscape Architect etc.,)
- 3**  
Engineering and Design Staff (e.g., Consulting Engineer, Civil Engineer, Mechanical Engineer, Chemical Engineer, Planning Engineer, Landscape Architect, Environmental/Wetland Scientist etc.)
- 4**  
Scientific and Research Staff (e.g., Chemist, Biologist, Analyst, Lab Technician, Environmental/Wetland Scientist etc.)
- 5**  
Operations/Inspection & Maintenance (e.g., Shift Supervisor, Foreman, Plant Operator, Service Representative, Collection Systems Operator, BMP Inspector, Maintenance, etc.)
- 6**  
Purchasing/Marketing/Sales (e.g., Purchasing, Sales Person, Market Representative, Market Analyst, etc.)
- 7**  
Educator (e.g., Professor, Teacher, etc.)
- 8**  
Student
- 9**  
Elected or Appointed Public Official (Mayor, Commissioner, Board or Council Member)
- 10**  
Other \_\_\_\_\_

## What are your KEY FOCUS AREAS?

(circle all that apply) (FOC)

- 1**  
Collection Systems
- 2**  
Drinking Water
- 3**  
Industrial Water/Wastewater/ Process Water
- 4**  
Groundwater
- 5**  
Odor/Air Emissions
- 6**  
Land and Soil Systems
- 7**  
Legislation (Policy, Legislation, Regulation)
- 8**  
Public Education/Information
- 9**  
Residuals/Sludge/Biosolids/Solid Waste
- 10**  
Stormwater Management/ Floodplain Management/Wet Weather
- 11**  
Toxic and Hazardous Material
- 12**  
Utility Management and Environmental
- 13**  
Wastewater
- 14**  
Water Reuse and/or Recycle
- 15**  
Watershed/Surface Water Systems
- 16**  
Water/Wastewater Analysis and Health/ Safety Water Systems
- 17**  
Other \_\_\_\_\_

## Optional Items (OPT)

**Years of industry employment?** \_\_\_\_\_

- 1** (1 to 5) **2** (6 to 10) **3** (11 to 20)  
**4** (21 to 30) **5** (>30 years)

**Year of birth?** \_\_\_\_\_

**Gender?** \_\_\_\_\_

- 1** Female **2** Male

**Education level? (ED)** \_\_\_\_\_

- 1** High School **2** Technical School  
**3** Some College **4** Associates Degree  
**5** Bachelors Degree  
**6** Masters Degree **7** JD **8** PhD

**Education/Concentration Area(s) (CON)** \_\_\_\_\_

- 1** Physical Sciences (Chemistry, Physics, etc.)  
**2** Biological Sciences **3** Engineering Sciences  
**4** Liberal Arts **5** Law **6** Business



Water quality professionals, with fewer than 5 years working experience and under the age of 35, are eligible to join WEF as an Active Member, while participating in the NEWEA/WEF Young Professionals Program. This program allows up to 50% off of the Active Member dues, valid for the first three years of membership. This program is available for new member applicants and Student Members.

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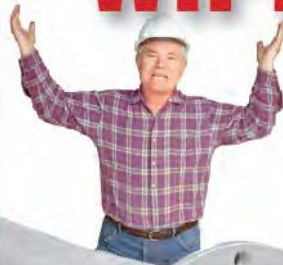
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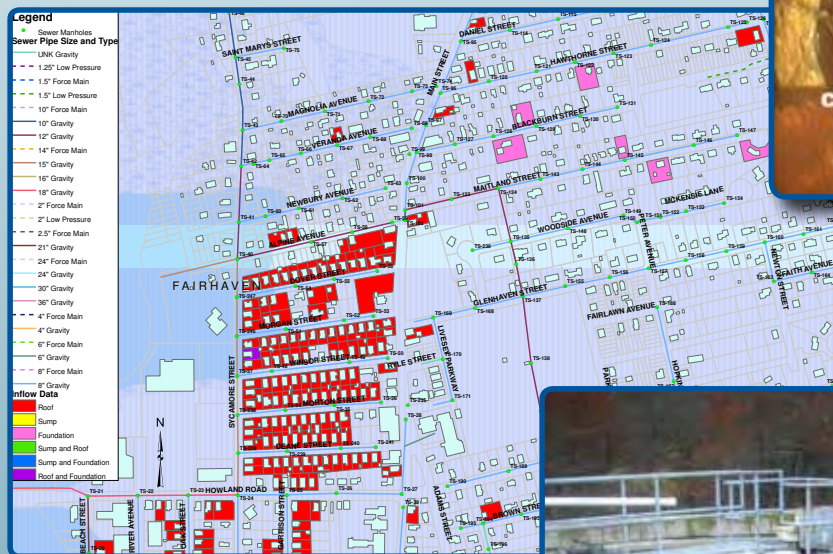
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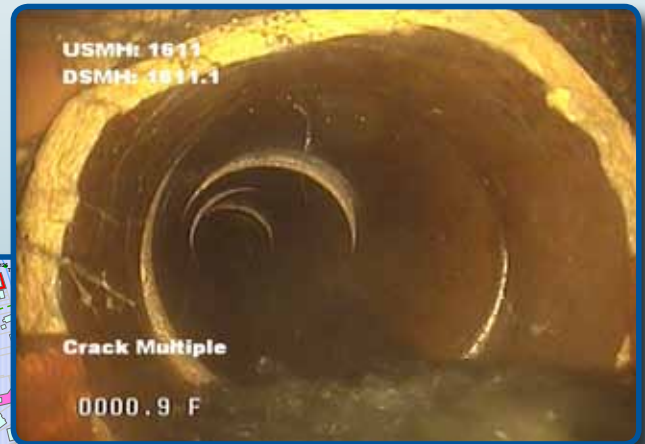
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